CROSS VALLEY CONTRACTORS LONG-TERM CONTRACT RENEWAL REGIONAL BIOLOGICAL ASSESSMENT

LOCATION:

CROSS VALLEY CONTRACTORS, CENTRAL VALLEY PROJECT CALIFORNIA

By

H. T. HARVEY AND ASSOCIATES

Ronald R. Duke, M.A., Principal-in-Charge
Kent Smith, B.A., Project Manager, Senior Wildlife Ecologist
Brian B. Boroski, Ph.D., Senior Wildlife Ecologist
Mary Bacca, M.S., Senior Plant Ecologist
Jeff Seay, B.A., Wildlife Biologist
Andrew Dilworth, B.S., Plant Ecologist

Prepared for:

Mr. William Stolp and Mr. Wellington Yee
URS Grenier Woodward Clyde
2520 Venture Oaks Way, Suite 250
Sacramento, CA 95833

And

Mr. Carl Dealy
U.S. Bureau of Reclamation
1243 N Street
Fresno, CA 93721-1813

January 17, 2001

Project No. 1660-03

TABLE OF CONTENTS

TABLE OF CONTENTS I
INTRODUCTION I
CONSULTATION TO DATE 6
CURRENT MANAGEMENT DIRECTION 7
DESCRIPTION OF PROPOSED ACTION 8
PROJECT AREA 10
STUDY PERIOD 12
ALTERNATIVES 12
Analysis of Alternate Actions 16
ISSUES ADDRESSED IN SEPARATE ENVIRONMENTAL ANALYSES 17
SPECIES ACCOUNTS 18
FEDERAL AND STATE ENDANGERED OR THREATENED SPECIES AND SPECIES PROPOSED FOR LISTING 18
Plants 18
Crustaceans 24
Insects 27
Fish 28
Amphibians 30
Reptiles 34
Birds 37
Mammals 43
SENSITIVE SPECIES AND SPECIES-OF-CONCERN 49
Plants 49
Animals 49
HABITAT STATUS 58
EFFECTS 70
EFFECTS ON SPECIAL-STATUS PLANT SPECIES 73
EFFECTS ON SPECIAL-STATUS ANIMAL SPECIES 76
Crustaceans 76
Insects 77
Fish 77
Amphibians 78
Reptiles 79
Birds 79
Mammals 80
SENSITIVE SPECIES AND SPECIES-OF-CONCERN 81
Plants and Animals 81
CUMULATIVE EFFECTS 81
CONCLUSION AND DETERMINATION 85
LITERATURE CITED 86
LIST OF CONTACTS/CONTRIBUTORS/PREPARERS 95
Preparers 95
APPENDIX A. FEDERAL AND STATE ENDANGERED AND THREATENED PLANTS, OR PLANTS PROPOSED FOR LISTING THAT OCCUR OR ARE

LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA 96
APPENDIX B. FEDERAL SENSITIVE PLANT SPECIES THAT OCCUR OR ARE LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA 98
APPENDIX C. FEDERAL AND STATE ENDANGERED AND THREATENED ANIMALS, OR ANIMALS PROPOSED FOR LISTING THAT OCCUR OR ARE LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA 101
APPENDIX D. FEDERAL SENSITIVE AND STATE SPECIES-OF-CONCERN AND FULLY PROTECTED ANIMAL SPECIES THAT OCCUR OR ARE LIKELYTO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA 103
APPENDIX E. CROSS VALLEY CONTRACTORS, SUBCONTRACTORS, AND ASSOCIATED U.S.G.S. QUADRANGLE AND COUNTY COVERAGE. 105
APPENDIX F. CONSULTATION HISTORY ON CVP-RELATED ACTIONS ON FILE WITH THE U.S. FISH AND WILDLIFE SERVICE FIELD OFFICE, SACRAMENTO CALIFORNIA 109
APPENDIX G. COMPARISON BETWEEN EXISTING CONDITIONS AND NEGOTIATED CONTRACT PROVISIONS FOR LONG-TERM CONTRACT RENEWAL WITHIN THE CROSS VALLEY CONTRACT SERVICE AREA.... 111

FIGURES:

Figure 1. The Location and Extent of the Cross Valley Contractors of the Central Valley Project Located on the Eastside of the San Joaquin Valley 11

TABLES:

Table 1. Federal and State Endangered and Threatened Plant Species, and Species Proposed for Listing that Have Been Observed or Are Expected to Occur in the Cross Valley Contract Service Area. 2
Table 2. Federal and State Endangered and Threatened Animal Species, and Species Proposed for Listing that Have Been Observed or are Expected to Occur in the Cross Valley Contractors Service Area. 3
Table 3. Federal Sensitive Plants Observed or Expected to Occur within the Cross Valley Contract Service Area. 4
Table 4. Special-status Animal Species that Have Been Observed or are Expected to Occur in the Cross Valley Contractors Service Area. 5
Table 5. Contractual Entitlements within the Cross Valley Contractors Service Area of the Central Valley Project. 9
Table 6. A Comparison, by Alternative, of Long-Term Contract Renewal Provisions Relevant to a Biological Assessment for the Cross Valley Contractors. 13
Table 7. Natural Communities and Associated Sensitive Habitats Occurring within the Cross Valley Contract Service Area. CNDDB sensitive habitats documented within Cross Valley CSA are Listed in Bold Italics. 59

INTRODUCTION

Consistent with Section 3404(c) of the Central Valley Project Improvement Act (CVPIA), the Bureau of Reclamation proposes to renew long-term water service contracts with the Cross Valley Contractors for a 25-year period. Long-Term Contract Renewal (LTCR) is a federal action that requires site specific environmental documentation prepared at the division or unit level. This Biological Assessment (BA) concentrates on the issues specific to the Cross Valley Contract Service Area. The Cross Valley Contractors BA is tiered from the Programmatic Environmental Impact Statement (PEIS). This procedure helps eliminate repetitive studies and discussions, and permits division-specific documents to focus on the most relevant issues within each division.

The purpose of this BA is to review the proposed Cross Valley Contractors LTCR in sufficient detail to determine if the proposed action may affect any of the Threatened, Endangered, Proposed, or Sensitive species in the Cross Valley CSA. This BA has been prepared in accordance with legal requirements set forth under section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)). This BA analyzes the direct, indirect, and cumulative impacts on listed and proposed species, and designated and proposed critical habitats from proposed alternatives for the continued water delivery to eight Central Valley Project (CVP) contractors and eleven subcontractors for agricultural, municipal, and industrial purposes.

Tables 1 and 2 list, by taxonomic group, the Federal and State Endangered and Threatened species, and those proposed for listing that have been observed or are expected to occur in the Cross Valley CSA. Tables 3 and 4 list, in a similar manner, the State Fully Protected species and Species-of-concern, and the Federal Sensitive species observed or expected to occur within the service area. The U.S. Geological Service (U.S.G.S.) quadrangles known to contain special-status plants are disclosed within the description of each species addressed within the Species Accounts section of this document. For a summary of the occurrence of special-status plants found within each water district of the Cross Valley CSA, refer to Appendices A and B. Appendices C and D contain summaries of the observed and expected occurrence of special-status animals found within each water district of the Cross Valley CSA.

Table 1. Federal and State Endangered and Threatened Plant Species, and Species Proposed for Listing that Have Been Observed or Are Expected to Occur in the Cross Valley Contract Service Area.

Common Name	Scientific Nomenclature	Listed Status
PLANTS		
Bakersfield smallscale	*Atriplex tularensis*	**SE**
Kaweah brodiaea	*Brodiaea insignis*	**SE**
Succulent Owl's Clover	*Castilleja campestris* ssp. *succulenta*	**FT, SE**
California jewelflower	*Caulanthus californicus*	**FE, SE**
Hoover's spurge	*Chamaesyce hooveri*	**FT**
Palmate-bracted bird's beak	*Cordylanthus palmatus*	**FE, SE**
Kern Mallow	*Eremalche kernensis*	**FE**
Hoover's eriastrum	*Eriastrum hooveri*	**FT**
Stiped adobe lily	*Fritillaria striata*	**ST**
San Joaquin woolly-threads	*Lembertia congdonii*	**FE**
Bakersfield cactus	*Opuntia basilaris* var. *treleasei*	**FE, SE**
San Joaquin Valley Orcutt grass	*Orcuttia inaequalis*	**FT, SE**
Hartweg's Golden Sunburst	*Pseudobahia bahiifolia*	**FE, SE**
San Joaquin adobe sunburst	*Pseudobahia peirsonii*	**FT, SE**
Keck's checkerbloom	*Sidalcea keckii*	**FE**
Green's tuctoria	*Tuctoria greenei*	**FE**

Key to listed status:

FE	Federally Endangered	FT	Federally Threatened
SE	State Endangered	ST	State Threatened

Table 2. Federal and State Endangered and Threatened Animal Species, and Species Proposed for Listing that Have Been Observed or are Expected to Occur in the Cross Valley Contractors Service Area.

Common Name	Scientific Nomenclature	Listed Status
CRUSTACEANS		
Vernal pool fairy shrimp	*Branchinecta lynchi*	**FT**
Vernal pool tadpole shrimp	*Lepidurus packardi*	**FE**
INSECTS		
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	**FT**
AMPHIBIANS		
California tiger salamander	*Ambystoma californiense*	**FP**
California red-legged frog	*Rana aurora draytonii*	**FT**
REPTILES		
Blunt-nosed leopard lizard	*Gambelia sila*	**FE, SE, SFP**
Giant garter snake	*Thamnophis gigas*	**FT, ST**
BIRDS		
California Condor	*Gymnogyps californianus*	**FE, SE,SFP**
Bald Eagle	*Haliaeetus leucocephalus*	**FPD, SE**
Swainson's Hawk	*Buteo swainsoni*	**ST**
American Peregrine Falcon	*Falco peregrinus anatum*	**SE, SFP**
Least Bell's Vireo	*Vireo bellii pusillus*	**FE, SE**
MAMMALS		
San Joaquin antelope squirrel	(*Ammospermophilus nelsoni*)	**ST**
Tipton kangaroo rat	(*Dipodomys nitratoides nitratoides*)	**FE, SE**
San Joaquin kit fox	(*Vulpes macrotis mutica*)	**FE, ST**

Key to listed status:

FE	Federally Endangered	FT	Federally Threatened
FP	Proposed for Federal Listing	FPD	Proposed for Removal from Federal List
SE	State Endangered	ST	State Threatened
SFP	State Fully Protected		

Table 3. Federal Sensitive Plants Observed or Expected to Occur within the Cross Valley Contract Service Area.

Common Name	Scientific Nomenclature	Listed Status*
PLANTS		
Heart-leaved thorn-mint	*Acanthomintha obovata* ssp. *obovata*	**FSC**
Forked fiddleneck	*Amsinckia vernicosa* var. *furcata*	**FSC**
Heartscale	*Atriplex cordulata*	**FSC**
brittlescale	*Atriplex depressa*	**FSC**
San Joaquin saltbush	*Atriplex joaquiniana*	**FSC**
Lesser saltscale	*Atriplex minuscula*	**FSC**
Lost Hills crownscale	*Atriplex vallicola*	**FSC**
South Coast Range morning-glory	*Calystegia collina* ssp. *venusta*	**FSC**
Slough thistle	*Cirsium crassicaule*	**FSC**
Hispid bird's-beak	*Cordylanthus mollis* ssp. *hispidus*	**FSC**
Recurved larkspur	*Delphinium recurvatum*	**FSC**
Spiny-sepaled button-celery	*Eryngium spinosepalum*	**FSC**
Kernville poppy	*Eschscholzia procera*	**FSC**
Hollisteria	*Hollisteria lanata*	**FSC**
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	**FSC**
Pale-yellow layia	*Layia heterotricha*	**FSC**
Comanche Point layia	*Layia leucopappa*	**FSC**
Panoche pepper-grass	*Lepidium jaredii* ssp. *album*	**FSC**
Jared's pepper-grass	*Lepidium jaredii* ssp. *jaredii*	**FSC**
Little mousetail	*Myosurus minimus* ssp. *apus*	**FSC**
Gairdner's yampah	*Perideridia gairdneri* ssp. *gairdneri*	**FSC**
Nine Mile Canyon phacelia	*Phacelia novenmillensis*	**FSC**
Sanford's arrowhead	*Sagittaria sanfordii*	**FSC**
Oil neststraw	*Stylocline citroleum*	**FSC**
Mason's neststraw	*Stylocline masonii*	**FSC**

* CNPS-only species not considered
Key to listed status: FSC - Federal Species-of-concern

Table 4. Special-status Animal Species that Have Been Observed or are Expected to Occur in the Cross Valley Contractors Service Area.

Common Name	Scientific Nomenclature	Listed Status
AMPHIBIANS		
Western spadefoot	*Scaphiopus hammondi*	SSC
REPTILES		
California horned lizard	*Phrynosoma coronatum frontale*	SSC
Silver legless lizard	*Anniella pulchra pulchra*	SSC
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	SSC
Western pond turtle	*Clemmys marmorata*	SSC
BIRDS		
American White Pelican	*Pelecanus erythrorhynchos*	SSC
Double-crested Cormorant	*Phalacrocorax auritus*	SSC
Western Least Bittern	*Ixobrychus exilis hesperis*	SSC
White-faced Ibis	*Plegadis chihi*	SSC
Osprey	*Pandion haliaetus*	SSC
White-tailed Kite	*Elanus leucurus*	SFP
Northern Harrier	*Circus cyaneus*	SSC
Sharp-shinned Hawk	*Accipiter striatus*	SSC
Cooper's Hawk	*Accipiter cooperii*	SSC
Ferruginous Hawk	*Buteo regalis*	SSC
Golden Eagle	*Aquila chrysaetos*	SSC, SFP
Merlin	*Falco columbarius*	SSC
Prairie Falcon	*Falco mexicanus*	SSC
Western Snowy Plover	*Charadrius alexandrinus nivosus*	SSC
Mountain Plover	*Charadrius montanus*	SSC
Long-billed Curlew	*Numenius americanus*	SSC
California Gull	*Larus californicus*	SSC
Burrowing Owl	*Athene cunicularia*	SSC
Long-eared Owl	*Asio otus*	SSC
Short-eared Owl	*Asio flammeus*	SSC
Loggerhead Shrike	*Lanius ludovicianus*	SSC
California Horned Lark	*Eremophila alpestris actia*	SSC
San Joaquin Le Conte's Thrasher	*Toxostoma lecontei macmillanorum*	SSC
Yellow Warbler	*Dendroica petechia*	SSC
Yellow-breasted Chat	*Icteria virens*	SSC
Tricolored Blackbird	*Agelaius tricolor*	SSC
MAMMALS		
Townsend's big-eared bat	*Corynorhinus townsendii*	SSC
Pallid bat	*Antrozous pallidus*	SSC
Tulare grasshopper mouse	*Onychomys torridus ramona tularensis*	SSC
Ringtail	*Bassariscus astutus*	SFP

Key to listed status: SSC State Species-of-concern SFP State Fully Protected

While designated Critical Habitat for listed species may occur within particular counties that that are served by the Cross Valley Unit, those habitats lie outside of the Cross Valley Contractors Service Area and the action addressed within this biological assessment does not fall within currently listed Critical Habitat for any federally listed species.

CONSULTATION TO DATE

The consultation history of water contract renewals for the Friant and Cross Valley divisions of the CVP is quite extensive, including the 1991 Friant long-term water contract renewal consultation, three interim water contract consultations covering both Friant and Cross Valley divisions (1995, 1998, 2000), and consultations on other large-scale projects and plans that impact species protected under the ESA. The biological opinions resulting from these consultations stand on their own merits, have established thresholds to ensure survival and recovery of listed species, and have established, or work towards establishing, a baseline for the effects considered by the consultations. Of particular note are: the Service's October 15, 1991, biological opinion on the Friant Water Contract Renewals (Friant, Service file #1-1-91-F-22); the Service's opinions on the Los Vaqueros Project—in particular the September 9, 1993, opinion (Los Vaqueros, Service file #1-1-93-F-35) and the April 27, 2000, opinion on the Los Vaqueros Pipeline (Los Vaqueros Pipeline, Service file #1-1-99-F-93); the Service's December 27, 1994, biological opinion on Interim Water Contract Renewal (Interim, Service file #1-1-94-F-69); the Service's March 6, 1995, biological opinion on Reclamations's Long-term Operations Criteria and Plan (OCAP, Service file #1-1-94-F-70); and the programmatic consultation on Implementation of the CVPIA and Continued Operation and Maintenance of the CVP (CVPIA, #1-1-98-F-0124).

To assist in support and understanding of this opinion, we have provided the following time line of recent Service biological opinions, germane to this opinion. Records of these consultations are on file at the Service's Sacramento Fish and Wildlife Office (SFWO). (Note: Service file number in parenthesis and addressed species identified in each).

October 15, 1991—Friant Water Contract Renewals (1-1-91-F-22), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species (amended May 14, 1992, appended to 1-1-95-F-39 on February 27, 1998)

February 12, 1993—Long-Term Operations Criteria and Plan for CVP Reservoirs (1-1-93-F-10), bald eagle, salt marsh harvest mouse, California clapper rail.

May 23, 1993—Operations Criteria and Plan (1-1-92-F-18), bald eagle, salt marsh harvest mouse, California clapper rail.

May 26, 1993—1993 Operations Criteria and Plan-Delta smelt (1-1-93-F-32) delta smelt.

September 2, 1993—Los Vaqueros vernal pool shrimp conference opinion (1-1-93-C-68), vernal pool fairy shrimp, longhorn fairy shrimp, California linderiella.

September 9, 1993—Los Vaqueros Project (1-1-93-F-35), delta smelt.

February 4, 1994—1994 Operations Criteria and Plan (1-1-94-F-2), delta smelt.

December 27, 1994—Interim Water Contract Renewal (1-1-94-F-69), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

February 23, 1995—Amendment of December 27, 1994, Interim Water Contract Renewal opinion to include critical needs planning (1-1-95-F-39).

March 6, 1995—Long-term Operations Criteria and Plan (1-1-94-F-70) delta smelt, delta smelt critical habitat, Sacramento splittail [amended April 26, 1995 (1-1-95-I-804)].

August 14, 1996—Interim Operation of Kern Water Bank (1-1-95-F-63), San Joaquin kit fox and many others. [Action converted to a Habitat Conservation Plan (1-1-97-F-108)].

April 26, 1996—Temporary Barriers (1-1-96-F-53), delta smelt and delta smelt critical habitat.

January 20, 1998—Interim Water Contract Renewal Opinion amendment (1-1-98-I-383), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

February 27, 1998—Reinitiation of Formal Endangered Species Consultation on the Supplemental Interim Renewal of Central Valley Project Water Contracts to include 14 Friant Water Contracts (1-1-98-I-595), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species.

March 19, 1998—Refuge Water Supply Program (1-1-98-F-61) giant garter snake.

May 4, 1998—Draft Jeopardy on Interim South Delta Project (1-1-97-F-184), delta smelt and delta smelt critical habitat.

December 7, 1998—Conveyance of Refuge Water Supply East and West Sacramento Valley
(1-1-99-F-15) giant garter snake.

March 11, 1999—Water Service Contracts with Sacramento County Water Agency, San Juan Water District, and City of Folsom (1-1-97-F-161), several species.

March 19, 1999—Solano Project Contract Renewal (1-1-99-F-54), several species.

April 27, 1999 — Los Vaqueros Pipeline, Contra Costa County (1-1-99-F-039), several species.

June 28, 1999—Refuge Water Conveyance Mendota Wildlife Management Area, Kern and Pixley National Wildlife Refuges (1-1-99-F-36) several species.

September 21, 1999—CVPIA Land Retirement Program Demonstration Project, Fresno, Kings and Tulare Counties (1-1-99-F-125) several species.

February 29, 2000—Interim Biological Opinion (1-1-00-F-0056) several species.

March 24, 2000—California Toxics Rule (1-1-98-F-21) several species.

November 21, 2000—Implementation of the CVPIA and Continued Operation and Maintenance of the CVP, Programmatic Consultation (#1-1-98-F-0124).

CURRENT MANAGEMENT DIRECTION

Previous contract renewal agreements guide current management in the Cross Valley Contractors service area. Additional guidance may be provided through the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998), and by existing regulations and policies related to protection of special-status species and their habitats (e.g., wetlands, riparian, vernal pools, etc.). Under the proposed action, existing management activities within the contract service area (facility operation and maintenance) are expected to continue in virtually the same manner as they are currently being carried out. Modifications to these existing activities affecting Threatened and Endangered species will be agreed upon and implemented through consultation with the USFWS.

DESCRIPTION OF PROPOSED ACTION

The purpose of the Long-Term Contract Renewal (LTCR) is to renew the water service contracts for the Cross Valley Contractors in a manner consistent with the provisions of CVPIA, Section 3404(c) (Appendix F). The proposed Action includes eight contractors and eleven subcontractors (Table 5). The renewal of these long-term contracts has three main objectives:

1. Continue the beneficial use of water, developed and managed as part of the CVP with a reasonable balance among competing demands, including the needs of irrigation and domestic uses; fish and wildlife protection, restoration, and mitigation; fish and wildlife enhancement; power generation; and other water uses consistent with requirements imposed by the State Water Resources Control Board (State Board) and the CVPIA.

2. Incorporate certain administrative conditions into the renewed contract to ensure that the CVP continues to comply with current Federal reclamation law and other applicable statutes.

3. Allow the continued reimbursement to the Federal government for costs related to CVP construction and operation.

Table 5. Contractual Entitlements within the Cross Valley Contractors Service Area of the Central Valley Project.

Cross Valley Contractors	Cross Valley Subcontractor	Maximum Contract Amount (acre-feet/year)
County of Fresno	Fresno County Waterworks # 34	3,000*
County of Tulare	Alpaugh Island Irrigation District	1,054
	Atwell Island Water District	1,055
	City of Lindsay	50
	City of Visalia	300
	Hills Valley Irrigation District	954
	Smallwood Vineyards	400
	Saucelito Irrigation District	100
	Stone Corral Irrigation District	950
	Strathmore PUD	400
	Styro-Tek, Inc	45
Hills Valley Irrigation District		3,345
Kern-Tulare Water District		40,000
Lower Tule River Irrigation District		31,102
Pixley Irrigation District		31,102
Rag Gulch Water District		13,300
Tri-Valley Water District		1,142
Total		128,299

* Fresno County Water Works 34 allocation out of this 3,000af is 420 af.

Source: U.S. Bureau of Reclamation (Reclamation). 2000. Cross Valley Contractors Long-Term Contract Renewal Draft Environmental Assessment. October 11, 2000 Mid-Pacific Region, Fresno, CA. 220 p.

PROJECT AREA

The project area includes the Cross Valley Contractors water user service area. The Cross Valley CSA is located on the eastern side of the San Joaquin Valley (Figure 1). In 1975, the locally financed Cross Valley Canal began operations that routed water from the California Aqueduct to the east side of the San Joaquin valley through a series of six lift pumps. The Cross Valley Canal begins at the California Aqueduct near Taft and conveys water across the valley to the vicinity of the Friant-Kern Canal near Bakersfield. The exchange is made possible by California Department of Water Resources (DWR) steering water through the State Water Project (SWP) to the Cross Valley Canal.

DWR diverts water for the Cross Valley Contractors from the Delta at the Harvey D. Banks Pumping Plant through the California Aqueduct and to the SWP's portion of San Luis Reservoir. From San Luis Reservoir, the water is conveyed via the San Luis Canal to the Cross Valley Canal turnout in Kern County and delivered to Arvin-Edison Water Storage District (AEWSD). AEWSD and other districts take delivery of the Delta water, then "exchange" water under contract with Reclamation from the Friant Division with other Reclamation contractors on the Friant-Kern Canal. The Cross Valley Canal contracts are for an annual delivery of 128,300 af/yr of water, depending on availability.

Water is delivered to the AEWSD in exchange for a portion of their water supply available through Millerton Lake. Through a series of complex water purchase, transport and exchange agreements, water is exchanged between AEWSD and six of the Cross Valley Contractors with contracts for CVP water pumped from the Delta. These exchange contractors are located north of the Cross Valley Canal, along the Friant-Kern Canal. The exchanges are based on a 1:1 water exchange ratio. Historically, there has been a sufficient water supply in the Friant Division to execute and complete the exchange within an annual time frame. In some dry years when the water was not readily available in the Friant Division, the balance of the exchange would be carried into subsequent year(s) when water became available to complete the transaction. Although the exchange may not have been completed within a year, the water exchange ratio would not change.

Two of the Cross Valley Contractors do not participate in a water exchange with AEWSD. Subject of Reclamation approval, Pixley Irrigation District and the Lower Tule River Irrigation District have discontinued the exchange with AEWSD and have transferred their water to other CVP water districts. These contractors use the proceeds from the transfer to purchase available water from willing sellers. As with all transfers, Reclamation continues to address such transfers with separate environmental documents. Although they have not chosen to exercise their right to exchange water, they are included in the study area covered by this BA.

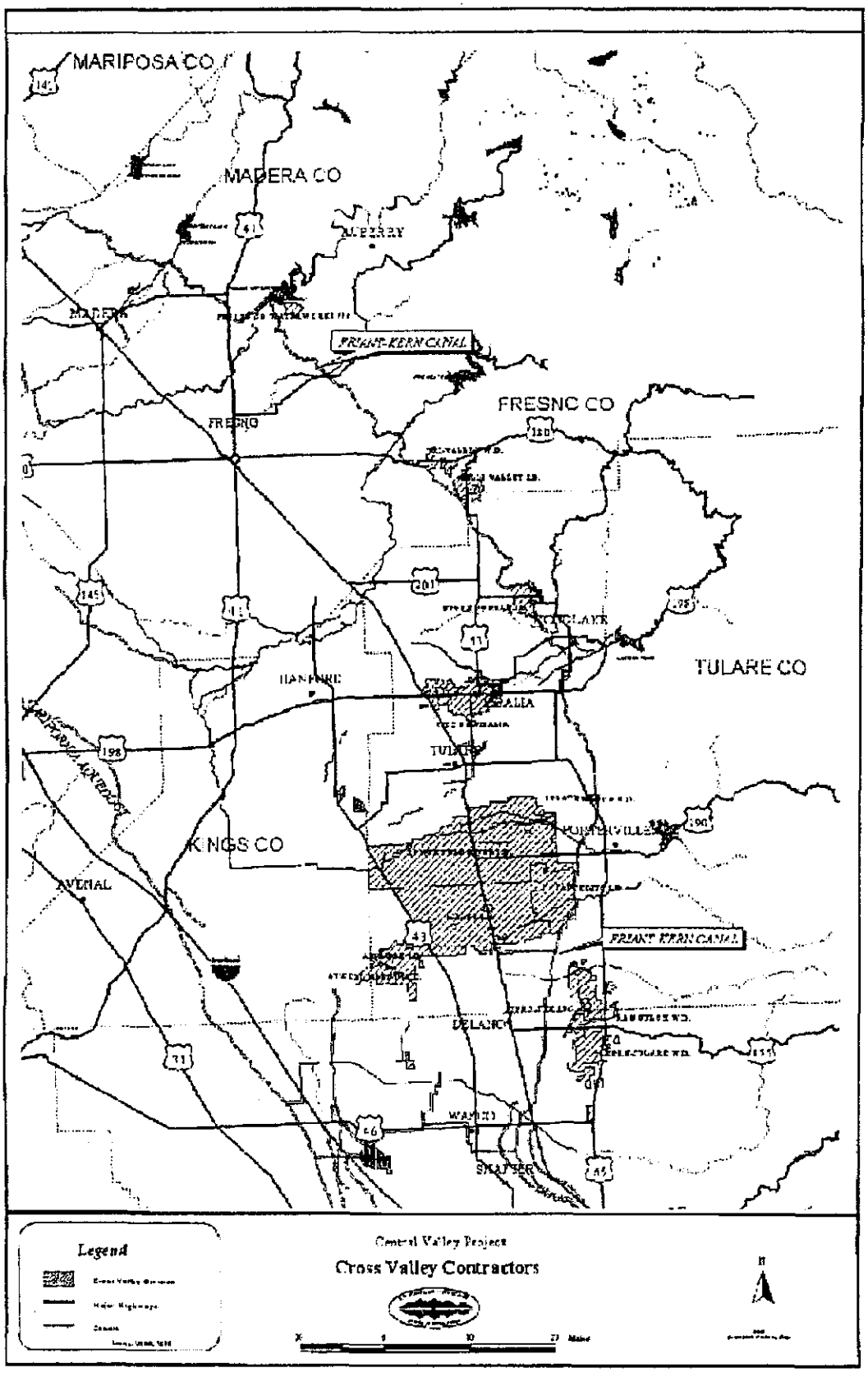


Figure 1. The Location and Extent of the Cross Valley Contractors Service Area of the Central Valley Project Located in the San Joaquin Valley.

STUDY PERIOD

The analysis for this BA was conducted for projected conditions in the Year 2026 that will extend through the first period of renewal for the 25-year long-term water service contracts. Interim time period conditions were not considered or evaluated with respect to changes in the CVP contract.

ALTERNATIVES

The contract renewal program is a negotiated process. Three alternatives have been identified under LTCR for the Cross Valley CSA. While the final outcome of the ongoing negotiations is not known at this time, Alternative 1 appears to most closely represent the current status the negotiation process. The general provisions of the three alternatives that are applicable to assessing environmental impacts or benefits are summarized in Table 6. Specific provisions of the final negotiated contract for the Cross Valley CSA are described in Appendix G.

All existing new and renewed contracts will be administered in conformance with the requirements and goals of the CVPIA. Furthermore, all renewed contracts will be examined by Reclamation to determine if the existing terms and conditions (such as endangered species compliance, water conservation, etc.) are adequate to minimize the impact of incidental take and whether they are consistent with existing Biological Opinions. If required, contracts will be amended by Reclamation to protect and conserve listed Threatened and Endangered species (Reclamation 2000).

Definition of Municipal and Industrial (M&I) Users. The definition of municipal and industrial users was established in portions of a 1982 Reclamation policy memorandum. In many instances, the definition of municipal users is easily definable. However, with respect to small tracts of land, the 1982 memorandum identified agricultural water as agricultural water service to tracts that can support $5,000 gross income for a commercial farm operation. The memorandum indicates that parcels greater than two acres can generally meet this criterion. The CVP for many years now has generally applied a definition of five acres or less for M&I uses. The CVP contractors can seek a modification for a demonstrated need of agricultural use on parcels between two and five acres in size and request such a modification from the Contracting Officer.

Definition of Class 1/Class 2 Water Supply. Within the Cross Valley CSA, water entitlements are classified as Class 1 and Class 2 water. The Class 1 water is defined as the quantity of water that could be delivered in a typical water year and is applied to both the irrigation, and Municipal and Industrial (M&I) contracts. All water commitments identified for M&I use are identified as Class 1 water. The Class 1 total water delivery is announced each year for the entire Division with each contractor receiving a prorated contractual amount. Class 2 water is delivered each year based on the available supply and is provided only for irrigation uses. Class 2 water is typically available in the full contract amount only during wet water years.

Table 6. A Comparison, by Alternative, of Long-Term Contract Renewal Provisions Relevant to a Biological Assessment for the Cross Valley Contractors.

Provision	No Action Alternative	Alternative 1	Alternative 2
Explanatory Recitals	Assumes water rights held by CVP from SWRCB for use by water service contractors under CVP policies	Assumes CVP Water Right as being held in trust for project beneficiaries that may become the owners of the perpetual right	Same as NAA
	Assumes that CVP is a significant part of the urban and agricultural water supply of users	Assumes CVP as a significant, essential, and irreplaceable part of the urban and agricultural water supply of users	Same as NAA
	Assumes increased use of water rights, need to meet water quality standards and fish protection measures, and other measures constrained use of CVP	Assumes that CVPIA impaired ability of CVP to deliver water	Same as NAA
	Assumes that loss of water supply reliability would have impact on socio-economic conditions and change land use	Assumes that loss of water supply reliability would have significant adverse socioeconomic and environmental impacts in CVP service area	Same as NAA
Definitions	**No Action Alternative**	**Alternative 1**	**Alternative 2**
"Charges"	Charges defined as payments required in addition to Rates	Assumes rewording of definition of Charges to exclude both Rates and Tiered Pricing Increments	Same as NAA
"Category 1 and Category 2"	Tiered Pricing as in PEIS	Not included	Tiered Pricing for Categories 1 and 2
"Contract Total"	Contract Total described as Total Contract	Same as NAA	Described as basis for Category 1 to calculate Tiered Pricing

"Landholder"	Landholder described in existing Reclamation Law	Assumes rewording to specifically define Landholder with respect to ownership, leases, and operations	Assumes rewording to specifically define Landholder with respect to ownership and leases
"M&I Water"	Assumes rewording to provide water for irrigation of land in units less than or equal to 5 acres as M&I water unless Contracting Officer satisfied use is irrigation	M&I water described for irrigation of land in units less than or equal to 2 acres	Same as NAA
Terms of Contract – Right to Use Contract	Assumes that contracts may be renewed Assumes convertibility of contract to a 9(d) contract same as existing contracts	States that contract shall be renewed Includes conditions that are related to negotiations of the terms and costs associated with conversion to a 9(d) contract	Same as NAA Same as NAA
Water to be Made Available and Delivered to the Contractor	Assumes water availability with existing conditions Assumes compliance with Biological Opinions and other environmental documents for contracting	Similar to NAA Not included	Actual water availability in a year is unaffected by Categories 1 and 2. Same as NAA
Point of Diversion and Responsibility for Distribution of Water	Assumes methods for determining point of diversion as in existing contracts	Assumes minor changes related to reporting	Same as NAA
Measurement of Water Within District	Assumes measurement for each turnout or connection for facilities that are used to deliver CVP water as well as other water supplies	Assumes measurement at delivery points	Assumes similar actions in NAA but applies to all water supplies

Rates and Method of Payment for Water	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 2 months.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 1 month.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 6 months.
Sales, Transfers, or Exchanges of Water	Assumes continuation of transfers with the rate for transferred water being the higher of the sellers or purchasers CVP cost of service rate	Assumes continuation of transfers with the rate for transferred water being the purchasers CVP cost of service rate	Same as NAA
Temporary Reduction - Return Flows	Assumes that current operating policies strives to minimize impacts to CVP water users	Assumes minor changes associated with methods described for discontinuance or reduction of payment obligations	Same as NAA
Constraints on Availability of Project Water	Assumes that current operating policies strive to minimize impacts to CVP water users	Assumes Contractors do not consent to future Congressional enactments which may impact them	Same as NAA
Rules and Regulations	Assumes that CVP will operate in accordance with then existing rules	Assumes minor changes with right to non-concur with future enactments retained by Contractors	Same as NAA
Water and Air Pollution Control	Assumes that CVP will operate in accordance with then-existing rules	Same as NAA	Same as NAA
Quality of Water	Assumes that CVP will operate in accordance with existing rules without obligation to operate towards water quality goals	Same as NAA	Same as NAA
Opinions and Determinations	PEIS recognizes that CVP will operated in accordance with existing rules	Assumes minor changes with respect to references to the right to seek relief	Same as NAA

Water Conservation	Assumes compliance with conservation programs established by Reclamation and the State	Assumes conditions similar to NAA with the ability to use State standards which may or may not be identical to Reclamation's requirements	Same as NAA
Operation and Maintenance by Non-federal Entity	Assumes that CVP will operate in accordance with existing rules and no additional changes to operation responsibilities under this alternative	Assumes minor changes to language that would allow subsequent modification of operational responsibilities	Assumes minor changes to language that would allow subsequent modification of operational responsibilities
Changes in Contractor's Service Area	Assumes no change in CVP water service areas absent Contracting Officer consent	Assumes changes to limit rationale used for non-consent and sets time limit for assumed consent	Same as NAA

Analysis of Alternate Actions

The amount of water allocated and the areas receiving water deliveries are the same under the three alternatives. The difference among the alternatives for LTCR, as they pertain to the potential affects on the biological resources within the Cross Valley CSA, is the blended water pricing structure in Alternative 2. Based on the conjunctive use within the Cross Valley CSA, contractors are expected to continue mixed use of CVP surface water and ground water, with greater emphasis on ground-water use during dry periods when CVP surface water is limited or expensive. Overall, the diversions from the Delta to meet demands south of Delta are less under the NAA than historically observed. No conversion of existing natural habitat into farmland will occur due to LTCR and the management of the Cross Valley Contractors water contracts under the NAA. Furthermore, no additional infrastructure (i.e., dams, increase in dam heights, canals, etc.) will be constructed. In summary, the surface water resources within the Cross Valley CSA under the NAA and Alternative 1 will not be affected.

A blended water pricing structure for CVP water evaluated under Alternative 2 is based on a five-year running average of delivered water. In most years, Alternative 2 would result in little or no change in surface water use from the NAA. In some years, the Cross Valley Contractors would switch from ground water to surface water, but this change is not predicted to have an effect on the San Joaquin River flows or other streams in the region. Changes in surface water use are not expected to result in additional diversions from the Delta or changes to San Luis Reservoir storage. Furthermore, Alternative 2 will not affect the deliveries in the Friant-Kern Canal or storage in Millerton Lake.

Compared to the NAA, in average and dry years there is no change in irrigated acreage expected under Alternative 2. In wet years, irrigated acres are expected to decrease by 0.1%. The additional water costs under Alternative 2 could result in an increase in the amount of land left fallow. If fallowed lands are restored to native conditions, they could provide habitat for special-status species. If the fallowed lands are not restored, a decrease in some agricultural crops such as alfalfa and grain crops could potentially impact the amount of nesting and feeding habitat for wildlife.

As the cost of water increases, the opportunity to provide wetland habitat by private landowners generally decreases. This could result in a decrease in the availability of wetland habitat in the Cross Valley region. If water use decreases, however, more water may be available to flow down the San Joaquin River, which would enhance the riparian zones and their habitat quality for wildlife.

ISSUES ADDRESSED IN SEPARATE ENVIRONMENTAL ANALYSES

The LTCR process addressed the needs analysis, changes in service areas, and water transfers in addition to the contract provisions. If the needs analysis indicated that the required amount of water was less than contract amounts, the CVP water service contract amount could be reduced. Because the CVP was initially established as a supplemental water supply for areas without adequate supplies, the needs for most districts are at least equal to the CVP water service contract and frequently exceeded the previous contract amount. Increases in total contract amounts are not examined since contract amounts are limited by the quantities in existing CVP contracts. Also excluded from this BA are analyses pertaining to changes in future water service area boundaries for use of CVP water. Any future changes to water service area boundaries for use of CVP water would be evaluated in separate technical and environmental analyses.

Several different types of transfers are considered for LTCR. Intra-CVP contract transfers have occurred regularly throughout the CVP and are frequently limited to scheduling changes between adjoining districts. Reclamation has historically issued and will continue to address these types of transfers under separate environmental analyses. Water transfers will continue to occur and the CVP long-term contracts will provide the mechanism for these transfers. Because CVPIA has allowed these transfers, as evaluated in the PEIS for the Preferred Alternative, the NAA includes water transfer provisions. These provisions for transfers are also included in both Alternatives 1 and 2. Identifying all of the water transfer programs that could occur with CVP water in the next 25 years is unnecessary since Reclamation would continue with separate environmental documents for proposed transfers.

SPECIES ACCOUNTS

FEDERAL AND STATE ENDANGERED OR THREATENED SPECIES AND SPECIES PROPOSED FOR LISTING

Plants

A query of the California Natural Diversity Database (CNDDB 2000) was performed to identify special-status plant species potentially occurring in the four counties (Fresno, Tulare, Kern, and Kings) and 29 quadrangles containing the Cross Valley CSA (Appendix E). In addition to counties and quadrangles, a number of CNDDB habitat categories were further specified in the query. These categories are somewhat distinct from the California Wildlife Habitat Relationship System (WHR) habitat types presented below but otherwise represent the same communities. Table 7 lists the CNDDB habitat categories corresponding to WHR categories. The CNDDB categories include: alkali marsh, alkali playa, aquatic, artificial flowing waters, artificial standing waters, chenopod scrub, cismontane woodland, freshwater marsh, marsh and swamp, riparian forest, riparian scrub, riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, ultramafic, valley and foothill grassland, vernal pool, and wetland. Further review of species identified in the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 1994) and the Federal Register (July 2000) augmented the CNDDB query results.

Only species that were reported to occur or documented to occur below 1000 feet were considered, though the range of some of these species extends above 1000 feet in elevation. The 1000-foot elevation was chosen to to account for any special status species typically occurring between the valley floor and foothills. A total of 16 plant species identified as Federal and State Endangered, Threatened, or Proposed for listing have been considered as potentially occurring in the four counties containing the Cross Valley CSA (Table 1). Observations for eight of these species have been documented within quadrangle areas containing portions of various Cross Valley districts. The remaining eight species had either no CNDDB occurrences within any of the districts, or only occurrences in quadrangles adjacent to Cross Valley districts. Refer to Appendix A for a summary of the occurrence of State and Federally listed plants by Cross Valley district.

California jewel-flower (*Caulanthus californicus*). Federal Status: Endangered; State Status: Endangered; CNPS List 1B. This annual herb occurs in chenopod scrub, and valley and foothill grassland habitats. The blooming period extends from February to May. This species ranges through six counties, including the 4 containing the Cross valley CSA . The plant is believed to be extirpated from these King and Tulare counties (CNPS 1994). Twenty-four CNDDB occurrences (both extirpated and extant) of this species have been reported within Tulare, Kings, Kern, and Fresno counties as of October 2000. The CNDDB reports that observations occurred between 1893 and 1993, and between the elevations of 265 and 2750 feet. Three of these observations occurred below 1000 feet within quadrangles containing portions of the Woodville, Saucelito School,

Delano East, and Richgrove quadrangles containing portions of many Cross Valley districts. See Appendix A for a list of these districts.

Suitable valley and foothill grassland habitat for this species is present from the valley floor to the lower elevation foothills of the Sierra Nevada. In addition, suitable chenopod scrub habitat is present within historic lakebeds with heavy, saline and/or alkaline clays in portions of the Cross Valley CSA, particularly in the southern San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes valley sink scrub, which is an element of chenopod scrub (Holland 1986). Most of this habitat has been extirpated due to flood control, agricultural development, and ground water pumping.

Palmate bracted bird's beak (*Cordylanthus palmatus*). Federal status: Endangered; State status: Endangered; CNPS List 1B. This annual, hemi-parasitic herb occurs in chenopod scrub, and valley and foothill grasslands with an alkaline influence. The blooming period extends from May to October. The range of this species is reportedly limited to Fresno County. Six CNDDB occurrences of this species have been reported within the Fresno County as of October 2000. The CNDDB reports that observations occurred between 1937 and 1996, and between the elevations of 160 and 195 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts.

Suitable low elevation valley and foothill grassland, and chenopod scrub within heavy, saline and/or alkaline clays are present throughout the Cross Valley CSA, and the San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes valley sink scrub, which is an element of chenopod scrub (Holland 1986). Most of this habitat has been extirpated due to flood control, agricultural development, and ground water pumping (Holland 1986). This species is threatened by agriculture and urbanization (Hickman 1993).

Kern Mallow (*Eremalche kernensis*). Federal Status: Endangered; State Status: None; CNPS List 1B. This annual herb occurs in chenopod scrub, and valley and foothill grassland habitats. The blooming period extends from March to May. The range of this species is limited to Kern County. Fifteen CNDDB occurrences of this species have been reported within Kern County as of October 2000. The CNDDB reports that observations occurred between 1938 and 1995, and between the elevations of 230 and 1700 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts. However, many observations occurred at low elevations in the Semitropic and Lost Hills NW quadrangle areas adjacent to areas of the Atwell Island and Alpaugh districts.

Suitable valley and foothill grassland containing eroded hillsides, and chenopod scrub within alkali flats are present in portions of the Cross Valley CSA, particularly in the southern San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes valley sink scrub, which is an element of chenopod scrub (Holland 1986). Most of this habitat has been extirpated due to flood control,

agricultural development, and ground water pumping (Holland 1986). This species is threatened by agriculture and grazing (Hickman 1993).

San Joaquin woolly-threads (*Lembertia congdonii*). Federal Status: Endangered; State Status: None; CNPS List 1B. This annual herb occurs in chenopod scrub, and valley and foothill grassland habitats. The blooming period extends from March to May. This species ranges through seven counties, including Fresno, Kern, and Kings counties, and Tulare County where it is believed to be extirpated (CNPS 1994). Sixty-eight CNDDB occurrences of this species have been reported within the Fresno, Kings, and Kern counties as of October 2000. The CNDDB reports that observations occurred between 1893 and 1997, and between the elevations of 190 and 1,700 feet. None of these observations occurred within quadrangle areas contained by any of the Cross Valley districts. However, many observations have occurred at an average of 325 feet in elevation in numerous quadrangle areas, which are adjacent to the Alpaugh, Atwell, and Kern-Tulare districts.

Suitable sandy valley and foothill grassland, and chenopod scrub within lakebeds of heavy, saline and/or alkaline clays are present in portions of the Cross Valley CSA, particularly towards the southwest San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes valley sink scrub, which is an element of chenopod scrub (Holland 1986). Most of this habitat has been extirpated due to flood control, agricultural development, and ground water pumping (Holland 1986).

Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). Federal Status: Endangered; State Status: Endangered; CNPS List 1B. This shrub occurs in chenopod scrub habitat and sandy soils within valley and foothill grassland habitat. The blooming period is May. The range of this species is limited to Kern County. Forty-four CNDDB occurrences of this species have been reported within Kern County as of October 2000. The CNDDB reports that observations occurred between 1932 and 1996, and between the elevations of 290 and 1,800 feet. Only one observation occurred below 1000 feet in the North of Oildale quadrangle area containing portions of the Kern-Tulare Water District. In addition, 22 observations occurred within the Oildale quadrangle area, which is adjacent to the above quadrangle and district.

Suitable valley and foothill grassland, and chenopod scrub forming arid plains are present in portions of the Cross Valley CSA, particularly towards the southeast San Joaquin Valley. This species is threatened by agriculture and grazing (Hickman 1993).

Hartweg's golden sunburst (*Pseudobahia bahiifolia*). Federal Status: Endangered; State Status: Endangered; CNPS List 1B. This annual herb occurs on clay soils within cismontane woodland, and valley and foothill grassland habitats. The blooming period extends from March to April. The range of this species is limited to Fresno and Madera counties. Four CNDDB occurrences of this species have been reported within Fresno County as of October 2000. The CNDDB reports that observations occurred between 1992 and 1995, and between the elevations of 440 and 460 feet. All of these observations

occurred within the Friant quadrangle area containing portions of the Fresno County Waterworks # 34.

Suitable valley and foothill grasslands, and open woodlands are present within portions of the Cross Valley CSA in the eastern San Joaquin valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes wildflower fields which are an element of valley and foothill grasslands (Holland 1986). This species is threatened by agriculture (Hickman 1993).

Bakersfield smallscale (*Atriplex tularensis*). Federal Status: Species-of-concern; State Status: Endangered; CNPS List 1B. This annual herb occurs in chenopod scrub. The blooming period extends from June to October. The range of Bakersfield smallscale is limited to Kern County. Two extirpated and one declining CNDDB occurrence of this species have been reported within Kern county as of October 2000. The CNDDB reports that observations occurred between 1934 and 1992, and between the elevations of 300 and 350 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts.

Suitable chenopod scrub habitats within lakebeds of heavy, saline, and/or alkaline clays are present in portions of the Cross Valley CSA, particularly in the southern San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes valley sink scrub which is an element of chenopod scrub (Holland 1986). Most of this habitat has been extirpated due to flood control, agricultural development, and ground water pumping (Holland 1986).

Kaweah brodiaea (*Brodiaea insignis*). Federal Status: Species-of-concern; State Status: Endangered; CNPS List 1B. This perennial, bulbiferous herb occurs in clay or granitic soils within cismontane woodland, and valley and foothill grassland habitats. The blooming period extends from April to June. The range of this species is limited to Tulare County and is known only from the Kaweah and Tule river drainages (CNPS 1994). Twenty-four CNDDB occurrences of this species have been reported within Tulare county as of October 2000. The CNDDB reports that observations occurred between 1982 and 1995, and between the elevations of 560 and 4000 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts.

Suitable valley and foothill grassland and woodland habitats are present in portions of the Cross Valley CSA, particularly in the southern Sierra Nevada foothills. This species is threatened by development, road maintenance, and grazing (Hickman 1993).

Striped adobe-lily (*Fritillaria striata*). Federal Status: None; State Status: Threatened; CNPS List 1B. This perennial, bulbiferous herb occurs in adobe soils within cismontane woodland and valley and foothill grassland habitats. The blooming period extends from February to April. The range of striped adobe-lily is limited to Kern and Tulare counties. Twenty CNDDB occurrences of this species have been reported within Kern and Tulare counties as of October 2000. The CNDDB reports that

observations occurred between 1922 and 1993, and between the elevations of 450 and 4780 feet. Two observations occurred below 1000 feet within the Porterville quadrangle area, which contains portions of the Lower Tule River Irrigation District.

Suitable valley and foothill grassland and woodland habitats underlain by adobe soils are present in portions of the Cross Valley CSA, particularly in the southern Sierra Nevada foothills (Hickman 1993). This species was considered for federal listing but was not given federal protection (USFWS 1999a). This species is threatened by citriculture, urbanization and grazing (CNPS 1994).

San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*). Federal Status: Threatened; State Status: Endangered; CNPS List 1B. This annual herb occurs in vernal pools. The blooming period extends from May to September. The range of this species includes Fresno, Madera, Tulare (reportedly extirpated), and two other counties that do not contain the Cross Valley CSA. Seven CNDDB occurrences of this species have been reported within Fresno and Tulare counties as of October 2000. The CNDDB reports that observations occurred between 1927 and 1997, and between the elevations of 315 and 2475 feet. Three observations occurred below 1000 feet within the Wahtoke/Orange Cove North, Friant, and Ivanhoe quadrangle areas, containing portions of many Cross Valley districts. See Appendix A for a list of these districts.

Suitable vernal pool habitat is present within portions of the Cross Valley CSA in Fresno and Tulare counties. Sensitive habitats (see Habitat Status section below) in which this species occurs include northern-hardpan, basalt-flow, and claypan vernal pools (Holland 1986). This species is threatened by citriculture, urbanization and grazing (CNPS 1994).

Keck's checkerbloom (*Sidalcea keckii*). Federal Status: Endangered; State Status: None; CNPS List 1B. This annual herb occurs in serpentine soils within cismontane woodland, and valley and foothill grassland habitats. The blooming period is April. The range of Keck's checkerbloom is limited to Tulare and Fresno counties. Two historic and one recent occurrence of this species have been reported within Tulare and Fresno counties as of October 2000. The CNDDB reports that observations occurred between 1939 and 1992, and between the elevations of 600 and 1400 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts. However, observations have occurred as low as 600 feet in elevation in the Piedra, and Pine Flat Dam, and Success Dam quadrangle areas, which are adjacent to quadrangles containing portions of many Cross Valley districts. See Appendix A for a list of these districts.

Suitable serpentine valley and foothill grassland is present in portions of the Cross Valley CSA, particularly in the southern Sierra Nevada foothills (Hickman 1993). This species is threatened by urbanization and grazing (CNPS 1994).

Greene's tuctoria (*Tuctoria greenei*). Federal Status: Endangered; State Status: Rare; CNPS List 1B. This annual herb occurs in vernal pools and blooms from May to

July. This species ranges through nine counties, including Fresno and Madera counties, and Tulare County, in which it is believed to be extirpated (CNPS 1994). Four historic CNDDB occurrences of this species have been reported within Fresno and Tulare counties as of October 2000. The CNDDB reports that observations occurred between 1936 and 1956, and between the elevations of 385 and 440 feet. None of these observations occurred within quadrangle areas contained by the Cross Valley districts.

Suitable vernal pool habitat is present within portions of the Cross Valley CSA contained by Fresno and Tulare counties. Sensitive habitats (see Habitat Status section below) in which this species occurs include northern-hardpan, basalt-flow, and claypan vernal pools (Holland 1986).This species is threatened by agriculture, urbanization and overgrazing (CNPS 1994).

Succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*). Federal Status: Threatened; State Status: Endangered; CNPS List 1B. This hemi-parasitic, annual herb occurs in vernal pools. The blooming period extends from April to May. The range of this species is limited to Fresno and Madera counties. Twelve CNDDB occurrences of this species have been reported within Fresno county as of October 2000. The CNDDB reports that observations occurred between 1964 and 1996, and between the elevations of 350 and 1980 feet. Four observations occurred below 1000 feet within the Friant quadrangle area, which contains portions of Fresno County Waterworks # 34.

Suitable vernal pool habitat is present within portions of the Cross Valley CSA, particularly in the southern Sierra Nevada foothills and the southeastern San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs include northern-hardpan, basalt-flow, and claypan vernal pools (Holland 1986). This species is threatened by urbanization and agriculture (Hickman 1993).

Hoover's spurge (*Chamaesyce hooveri*). Federal Status: Threatened; State Status: None; CNPS List 1B. This annual herb occurs in vernal pools and blooms in July. The CNPS reports the range of this species includes Tulare and five other counties which do not contain any portions of the Cross Valley CSA. Six CNDDB occurrences of this species have been reported within Tulare county as of October 2000. The CNDDB reports that observations occurred between 1941 and 1997, and between the elevations of 315 and 345 feet. Two observations occurred within the Ivanhoe quadrangle area, which contains portions of the Stone Corral Irrigation District.

Suitable vernal pool habitat is present in portions of the Cross Valley CSA located in Tulare County. Sensitive habitats (see Habitat Status section below) in which this species occurs include northern-hardpan, basalt-flow, and claypan vernal pools (Holland 1986). This species is threatened by grazing, agriculture, and non-native plants (CNPS 1994).

Hoover's eriastrum (*Eriastrum hooveri*). Federal Status: Threatened; State Status: None; CNPS List 4. This annual herb occurs in chenopod scrub and valley and foothill grassland habitats. The blooming period extends from April to July. The range of this

species includes Fresno, King, Kern, Tulare, and three other counties that do not contain any areas of the Cross Valley CSA.

There are no CNDDB records of this species within Fresno, King, Kern, or Tulare counties as of October 2000; however, suitable chenopod scrub, and valley and foothill grassland habitats are present at lower elevations within portions of the Cross Valley districts. Sensitive habitats (see Habitat Status section below) in which this species occurs includes wildflower fields which are an element of valley and foothill grasslands (Holland 1986). Therefore, Hoover's eriastrum could potentially occur within the Cross Valley CSA. This species is threatened by agriculture, grazing and urbanization (CNPS 1994).

San Joaquin adobe sunburst (*Pseudobahia peirsonii*). Federal Status: Threatened; State Status: Endangered; CNPS List 1B. This annual herb occurs in adobe soils within the cismontane woodland, and valley and foothill grassland habitats. The blooming period extends from March to April. The range of this species is limited to Fresno, Kern, and Tulare counties. Thirty-nine CNDDB occurrences of this species have been reported within Fresno, Kern, and Tulare counties as of October 2000. The CNDDB reports that observations occurred between 1897 and 1996, and between the elevations of 290 and 2600 feet. Ten of these observations occurred below 1000 feet within the Richgrove, Tulare, Porterville, Lindsay, Stokes Mtn., and Wahtoke quadrangle areas containing portions of many Cross Valley districts. See Appendix A for a list of these districts

Suitable clayey valley and foothill grassland are present within portions of the Cross Valley CSA, particularly in the southern Sierra Nevada foothills and the southeastern San Joaquin Valley. Sensitive habitats (see Habitat Status section below) in which this species occurs includes wildflower fields, which are an element of valley and foothill grasslands (Holland 1986). This species is threatened by agriculture and flood control (Hickman 1993).

Wildlife

The following listed or proposed threatened and endangered wildlife species are known to occur, potentially occur, or could otherwise be indirectly impacted by the proposed action (also refer to Appendix C).

Crustaceans

Vernal pool fairy shrimp (*Branchinecta lynchi*). Federal Listing Status: Threatened; State Listing Status: None. The vernal pool fairy shrimp is a member of the aquatic crustacean order Anostraca and is endemic to vernal pools in the Central valley, eastern coastal foothills from Tehama to Riverside counties, and a limited number of sites in the Transverse Range and Santa Rosa Plateau of California (Eng et al. 1990, Sugnet & Associates 1993, USWFS 1994). It ranges in size from 0.4 to 1.0 inches and differs from the Colorado fairy shrimp, which it most resembles, by the antennae and

pouch. The basal segment outgrowth below and posterior to the pulvillus is ridge-like on the antennae and the pouch is shorter and broader in the vernal pool fairy shrimp. Vernal pool fairy shrimp rarely co-occur with other species of fairy shrimp and when they do they are never numerically dominant (USFWS 1994).

The vernal pool fairy shrimp is in danger of extinction principally as the result of flood control, highway, and utility projects, urban development, conversion of native habitats to agriculture, and stochastic events by virtue of the small isolated nature of many of the remaining populations (USFWS 1994). Habitat loss can occur from the direct destruction and modification of pools due to filling, grading, disking, or leveling. In fact, any activity or disturbance that alters the hydrologic regime of an area containing vernal pools may reduce the population size or reproductive success of these animals or eliminate them altogether. The species was listed as Endangered by the USFWS in 1994 largely because of the significant threats associated with future habitat loss and fragmentation (USFWS 1994). The State of California has not designated the species with any special status (CNDDB 2000).

Their present distribution is restricted to vernal pools within a geographic range extending from Shasta County south through the Central Valley into Tulare County, and along the central coast range from northern Solano County south into San Benito County (USFWS 1994). This species, however, occurs sporadically within local vernal pool complexes. The total population of vernal pool fairy shrimp is known from only 32 locations, about a quarter of which are represented by a single pool.

The vernal pool fairy shrimp matures rapidly which allows it to persist in pools that are filled for only a short period, but it can persist into the spring when and where pools persist longer. The active period for this species of shrimp has been observed to extend from early December to early May (USFWS 1994). The pools usually occur as complexes because of the influences of the topography and geology of the area. These complexes often consist of a dense, interconnected mosaic of small pools or a less dense dispersion of larger pools. The life history of the shrimp and the variability of their aquatic environment suggest that a metapopulation framework is the best way to understand and depict local populations of this species. Using this approach, populations would be defined from pool complexes and not individual pools. This line of reasoning leads to the conclusion that the distribution and abundance of the vernal pool fairy shrimp should be based on the distribution and number of occupied vernal pool complexes throughout the species' range.

The shrimp play an important role in the community ecology of these pools and are themselves ecologically dependent on seasonal fluctuations in this habitat. The pools that vernal pool fairy shrimp inhabit have low conductivity, total dissolved solids, alkalinity, and chloride levels. These pools are typically clear to tea-colored and occur most commonly in grass or mud bottomed swales or basalt lava flow depressions in unplowed grasslands. Single populations, however, are known to occur in a sandstone rock outcrop and an alkaline vernal pool (USFWS 1994).

The shrimp swim or glide using 11 pairs of swimming legs that move in a wave-like motion from anterior to posterior (USFWS 1994). In general, these shrimp eat algae, bacteria, protozoa, rotifers, and bits of detritus (Pennak 1989, USFWS 1994). Female fairy shrimp carry eggs in a ventral brood sac. The eggs are either dropped to the bottom or remain in the sac and sink with the female when she dies. The population survives through the dry summer months as diapaused eggs in the pool sediment. Depending upon the species, the resting eggs of fairy shrimp can survive freezing, heat, and prolonged desiccation. Some of these eggs will hatch when the pool fills with water in subsequent seasons, while the remaining eggs remain in the sediment. Eggs contained within the sediment at any given point can represent eggs deposited from several breeding seasons. The early stages of fairy shrimp rapidly develop into adults whose populations disappear long before the vernal pools dry up. This life history contributed to the basis for a standard survey protocol developed by the USFWS to determine the presence or absence of the vernal pool fairy shrimp.

Amphibians, dytiscid beetle larvae, caddis fly larvae, and waterfowl are the chief predators of fairy shrimp (Pennak 1989). The ability of this species to withstand disturbance most likely depends on the specific circumstances such as the nature and the intensity of the disturbance, and the amount of the original egg bank destroyed. Low to moderate levels of livestock grazing may pose no impact or benefit crustaceans in vernal pools. Overgrazing, however, is probably detrimental to vernal pool species because of the high degree of physical disturbance and likely changes in water chemistry and quality (USFWS 1994). While waterfowl consume adults, this action may play an important role in dispersal of fairy shrimp since viable eggs can pass through waterfowl digestive tracts and be deposited elsewhere.

Vernal pool fairy shrimp are known from many of the quadrangle areas that contain the Cross Valley CSA.

Vernal pool tadpole shrimp (*Lepidurus packardi*). Federal Listing Status: Endangered; State Listing Status: None. Vernal pool tadpole shrimp are a member of the aquatic crustacean order Notostraca. Adults possess 35 pairs of legs and two long cercopods, and may reach a length of two inches. The species is endemic to vernal pools throughout the Central Valley, but their current distribution is restricted to vernal pool habitats in 18 populations within the valley. These populations occur in the north, east of Shasta County south to the San Luis National Wildlife Refuge in Merced County, and from a single vernal pool complex located on the San Francisco Bay National Wildlife Refuge in Alameda County (USFWS 1994). Like the other vernal pool branchiopods discussed, the abundance and distribution vernal pool tadpole shrimp should be based on the distribution and number of occupied vernal pool complexes throughout the species' range and not individual vernal pools.

The vernal pool tadpole shrimp is in danger of extinction for the same reasons given for the vernal pool fairy shrimp, principally habitat loss (USFWS 1994). Recall that habitat loss can occur from the direct destruction and modification of pools, and that any activity or disturbance that alters the hydrologic regime of an area containing vernal pools may

reduce the population size or reproductive success of these animals or eliminate them altogether. The vernal pool tadpole shrimp was listed as Endangered by the U.S. Department of the Interior in 1994 largely because of the significant threats associated with future habitat loss and fragmentation (USFWS 1994). The State of California has not designated the species with any special status (CNDDB 2000).

The vernal pools inhabited by vernal pool tadpole shrimp typically contain clear to highly turbid water with very low conductivity, total dissolved solids, and alkalinity. Clear water pools mostly occur in grass-bottomed swales within grasslands having established alluvial soils underlain by hardpan. The turbid water habitats are associated with mud-bottomed pools. The vernal pool tadpole shrimp matures slowly and is long lived so the adults are often present and reproductive until the pools dry up in spring.

Unlike fairy shrimp, vernal pool tadpole shrimp swim with their legs down, climb on objects, and plow through sediments on the pool bottom (USFWS 1994). Their omnivorous diet contributes to the importance of their ecological role within vernal pool communities. Vernal pool tadpole shrimp consume detritus, earthworms, mollusks, dead tadpoles, frog eggs, fairy shrimp, and a variety of other invertebrates and microorganisms (Pennak 1989, USFWS 1994).

Female tadpole shrimp produce up to six clutches of eggs per season, yielding more then 800 eggs in all, which are deposited on vegetation at the bottom of the pool. A portion of the eggs will hatch immediately while the rest enter diapause (dormancy). Adults remain present and reproductively active until the pools evaporate. Like fairy shrimp, the population survives through the dry summer months as diapaused eggs in the pool sediment. Some of these eggs will hatch when the pool fills with water in subsequent seasons, while the remaining eggs remain in the sediment (USFWS 1994). Eggs contained within the sediment at any given point can represent eggs deposited from several breeding seasons. Vernal pool tadpole shrimp reach maturity 3 to 4 weeks after initial inundation of the vernal pool. The USFWS has developed standard survey protocols for wet and dry seasons to determine the presence or absence of this species in vernal pool habitats.

The vernal pool tadpole shrimp's diet, dispersal mechanisms, and ability to with stand disturbance are believed to be similar to those of the vernal pool fairy shrimp. No recovery plan has been developed for this species, nor has critical habitat been designated. The conservation efforts for this species are the same as those previously discussed for the vernal pool fairy shrimp.

Vernal pool tadpole shrimp are known from many of the quadrangle areas that contain the Cross Valley CSA.

Insects

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). Federal Listing Status: Threatened; State Listing Status: None. The bodies of valley

elderberry longhorn beetles range in size from 13 to 25 mm with males typically being shorter and stouter than females. The beetles have long antenna, often in excess of two-thirds the length of their body. Adult beetles feed upon the leaves of elderberry (*Sambucus spp.*) shrubs and lay their eggs within crevices of the bark on the stems of the plant (Arnold et al. 1994). After about ten days, the eggs hatch and the larvae bore into the pitch. The larvae and pupae of the beetle live within the stem of the shrub for up to 2 years before they pupate. Upon pupation, the adults chew through the bark leaving a distinctive exit hole that can be used to confirm the presence of the species without direct observation of individuals.

The valley elderberry longhorn beetle historically ranged throughout the Central Valley, from Shasta County south into Kern County (Arnold et al. 1994). In contrast, surveys conducted between 1984 and 1991 detected valley elderberry longhorn beetles in only 12 patches of natural riparian vegetation along the Sacramento, American, and San Joaquin rivers and their tributaries (Arnold et al. 1994). The loss of habitat is the single greatest factor contributing to the decline of this species. Riparian forests throughout the Central Valley have been altered as a result of human activities associated with urban development, agriculture, and water diversions and conveyance.

The valley elderberry longhorn beetle was listed as Threatened by the USFWS in 1980. The State of California has not designated any insect as Endangered, Threatened, fully protected, or a Species-of-concern. Conservation efforts aimed at the species' recovery have included protecting existing elderberry thickets, replanting elderberry shrubs, and transplanting elderberry shrubs inhabited by beetle larvae to new sites. Two sections of the riparian forest community along the American River have been designated as critical habitat for the valley elderberry longhorn beetle.

All of the contractors that that comprise the Cross Valley CSA are within the boundaries of the historical distribution of the valley elderberry longhorn beetle. There are recent records or their occurrence from the San Joaquin River, the Tule River, and Deer Creek, all of which flow through contractors in the Cross Valley (CNDDB 2000).

Fish

Delta Smelt (*Hypomesus transpacificus*). Federal Status: Threatened; State Status: Threatened. The delta smelt is a small, slender-bodied fish, with a typical adult size of 2-3 inches although some may reach lengths up to 5 inches. The delta smelt is a euryhaline fish, native only to the Sacramento–San Joaquin estuary. It ranges from the lower reaches of the Sacramento and San Joaquin rivers, through the Delta, and into the Suisun Bay (Moyle 1976). They have been found as far upstream as as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River. They extend downstream as far as San Pablo Bay. Delta smelt are found in brackish water. They usually inhabit salinity ranges of less than 2 parts per thousand (ppt) and are rearely found at salinities greater than 14ppt.

During the late winter to early summer, delta smelt migrate to freshwater to spawn. Females only produce between 1000 and 2600 eggs that sink to the bottom and attach to the substrate. Larvae hatch between 10-14 days, are planktonic, and are washed downstream until they reach areas near the entrapment zone where salt and fresh water mix. Delta smelt are fast growing and shortlived with the majority of growth within the first 7 to 9 months of life. Most smelt die after spawning in the early spring although a few survive to a second year. The species feeds entirely on small crustaceans (zooplankton).

The delta smelt was historically, one of the most common fish in the Sacramento-San Joaquin Estuary. Abundance fluctuates greatly from year to year, however, information from studies conducted between 1983 and 1992 indicated a dramatic decline in the species population. The total number of delta smelt is not known. However, delta smelt are considered environmentally sensitive because they have a one year life cycle, unusually low fecundidy for a fish with planktonic larvae, a limited diet, and reside primarily within the interface between salt and freshwater.

The delta smelt does not occur within the Cross Valley CSA. Primary threats to this species include reductions in outflow form the Sacramento-San Joaquin Estuary, entrainment to water diversions, extremely high outflows, changes in food organisms, contamination by toxic substances, disease, competition and predation, and, loss of genetic integrity by hybridization with the introduced wakasagi.

Sacramento Splittail (*Pogonichthys macrolepidotus*). Federal Status: Threatened; State Status: None. The Sacramento Splittail is a native freshwater fish of California, formerly common in the lakes and streams of the Central Valley (Moyle et al. 1995). The name splittail refers to the distinctive tail of the fish. The species is a large cyprinid fish that can exceed 40 centimeters (16 inches) in length. Historically, splittail were found as far north as Redding on the Sacramento River (at the Battle Creek Fish Hatchery in Shasta County), as far south as the present-day site of Friant Dam on the San Joaquin River, and up the tributaries of of the Sacramento River as far as the current Oroville Dam site on the Feather River and Folsom Dam site on the American River.

The current range is much reduced from the historic distribution and is now largely confined to the Delta, Suisun Bay, Suisun Marsh, Napa River, Petaluma River and other parts of the Sacramento-San Joaquin estuary (Moyle et al. 1995). On the Sacramento River, the Red Bluff Diversion Dam in Tehema County limits them to the downstream reaches of the river. It is unknown how far upstream they currently occur on the San Joaquin River. They have been recorded near the confluence with the Merced River and above the junction with the Toulumne River, mostly during wet years when the fish have greater access to these reaches.

Splittail are relatively long-lived, frequently reaching 5-7 years of age. Females are highly fecund, with the largest females producing over 250,000 eggs (Daniels and Moyle 1983). Populations fluctuate annually depending on spawning success, which is highly correlated with freshwater outflow and the availability of shallow-water habitat with

submerged vegetation. Fish usually reach sexual maturity by the end of their second year. Within each spawning season older fish reproduced first, followed by younger individuals. Spawning occurs over flooded vegetation in tidal freshwater and euryhaline habitats of estuarine marshes and sloughs and slow-moving reaches of large rivers. Larvae remain in shallow, weedy areas close to spawning sites for 10 to 14 days and move into deeper water as they mature and swimming ability increases.

Splittail are benthic foragers. In the Suisun Marsh, they feed primarily on oppossum shrimp (*Neomysis mercedis*, and presumably, the exotic *Acanthomysis spp.* as well), benthic amphipods (*Corophium*), and harpactacoid copepods, although detrital material makes up a large percentage of their stomach contents (Daniels and Moyle 1983). In the Delta, clams, crustaceans, insect larvae, and other invertebrates also are found in the diet.

The Splittail is not known to presently occur within the Cross Valley CSA. The primary threats to this species include adverse water flows and poor water quality resulting from the export of water from the Sacramento and San Joaquin Rivers, drought, loss of shallow water habitat, introduced aquatic species, and agricultural and industrial pollutants.

Amphibians

California Tiger Salamander (*Ambystoma californiense*). Federal Status: Proposed; State Status: None. The California tiger salamander, once thought a subspecies of the tiger salamander (*Ambystoma tigrinum*), is medium size among California salamanders with a total length up to 8.5 inches. The species has disappeared from a significant portion of its range due to habitat loss attributed to agricultural practices and urbanization, and the introduction of non-native aquatic predators (e.g. bluegill [*Lepomis macrochirus*], largemouth bass [*Micropterus salmoides*], mosquitofish [*Gambusia affinis*], and bullfrogs [*Rana catesbeiana*]). The California tiger salamander's current range includes the Great Central Valley of California and adjacent foothill districts as well as the coastal grasslands from the vicinity of San Francisco Bay south at least to Santa Barbara County (Storer 1925, Morey 1988).

The California tiger salamander's preferred breeding habitat is pond environments persisting a minimum of three to four months on an annual basis. Examples of such environments include vernal and ephemeral pools, and human-made ponds surrounded by uplands that contain small mammal burrows. The species will use permanent ponds provided that aquatic vertebrate predators are not present (Stebbins 1954). These ponds provide breeding and larval habitat while burrows excavated by small mammals such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gophers (*Thomomys bottae*) support juvenile and adult salamanders in upland habitats.

The species typically breeds from early December through mid-March, resulting in larval metamorphis and migration from the pond from late May through late July (Storer 1925, Morrison and Van Vuren 1993). Adults occupy burrows most of the year with the exception of the winter breeding season when they migrate to breeding ponds. This migration often occurs at night during the first moderate to heavy winter rain. Newly

metamorphosed juveniles from the previous summer that have not reached maturity by the breeding season presumably remain in burrows instead of migrating to ponds like adults. California tiger salamanders take several years to reach maturity and do not necessarily breed every year, even if sufficient habitat is available.

Females attach their eggs singly or in small clumps to submerged vegetation or directly on the bottom of the pool if emergent vegetation is lacking. The eggs hatch approximately one week after they are deposited. The larvae prey upon invertebrates and other amphibian larvae for between three and six months, during which time they metamorphose into juveniles. Juveniles typically leave the pools in mass during a one- to two-week period, usually as the ponds dry. The juveniles then search for available burrows where they feed and grow until the following winter.

Studies on other *Ambystoma* species indicate that the dates of migration and emigration vary as a function of several factors, most importantly annual rainfall pattern, and spring and summer temperatures (Semlitsch 1983, 1985, Semlitsch and Wilbur 1988). Emigration from breeding ponds by metamorphs on the Concord Naval Weapons Station was nocturnal and concentrated between 22:00 and 1:00 (Morrison and Van Vuren. 1993). Morrison and Van Vuren (1993) reported adult salamanders moving further on their migrations out of the breeding pond than juvenile emigrants. Their data supports the hypothesis that salamanders were moving short distances each night for several days or weeks as opposed to making a single extended move. Maximum distances recorded from the center of the pond were 398.5 feet for adults and 162.4 feet for juveniles from the same pond (Morrison and van Vuren 1993). Thus, they recommended that 398.5 feet should serve as the absolute minimum radius of protection from a breeding pond to allow for variation between sites and years, and to protect salamanders that have settled into temporary sites that are likely to be abandoned before the next migration.

California tiger salamanders are known from many of the quadrangle areas that contain the Cross Valley CSA.

California Red-legged Frog (*Rana aurora draytonii*). Federal Status: Threatened; State Status: None. The California red-legged frog is a member of the family Ranidae within the order Anura, and is one of two subspecies of the red-legged frog (*Rana aurora*) (USFWS 2000a). The *draytonii* subspecies was included as a Category 1 candidate species in the U.S. Fish and Wildlife Service's Annual Notice of Review in November 21, 1991 (USFWS 1991). On June 24, 1996, the California red-legged frog was officially listed as a Threatened species under the auspices of the FESA (USFWS 1996) based largely on a significant range reduction and continued threats to surviving populations (Miller 1994). Factors related to declines in populations of red-legged frogs include the degradation or loss of habitat attributed to agricultural practices, introduced plants and animals, livestock grazing, mining, water diversions and impoundments, water quality, recreation activities, timber harvesting, and urbanization (USFWS 2000a). In the Central Valley of California alone, more than 90 percent of the historic wetlands have been lost or altered because of agricultural and urban development (Dahl 1990).

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), with adults obtaining a length of 3.4 to 5.4 inches from the tip of the snout to the rear of the vent (Jennings and Hayes 1994a). Juvenile frogs are 1.5 to 3.4 inches from the tip of the snout to the rear of the vent and have the same coloration as adults except that the dorsolateral folds are normally yellow or orange colored, especially in very young individuals (Stebbins 1985). Larval frogs range from 0.6 to 3.1 inches in length.

Adult California red-legged frogs have been observed to breed from late November through early May after the onset of warm rains (Storer 1925, Jennings and Hayes 1994a), although California red-legged frogs in Alameda County were found to breed from late January though March during the 1990s (Jennings, pers. observ.). Male frogs typically call in small mobile groups of three to seven individuals that attract females (Jennings and Hayes 1994a). Females move toward the calling groups and amplex a male. Following amplexus, the females move to oviposition sites where they attach an egg mass of 2,000 to 6,000 moderate-sized (2.0 to 2.8 mm diameter) eggs to an emergent vegetation brace such as tule stalks (*Scirpus* spp.), grasses (Poaceae), or willow (*Salix* spp.) roots just below the water surface (Storer 1925, Livezey and Wright 1947) so that the egg masses float on the surface of the water (Hayes and Miyamoto 1984). After reproduction, males usually remain at the breeding sites for several weeks before moving to foraging habitats, whereas females immediately move to those habitats (Jennings, unpubl. data).

Embryos of California red-legged frogs hatch in 6 to 14 days after fertilization and resulting larvae require three and half to seven months to attain metamorphosis at a total length of 2.6 to 3.4 inches (Storer 1925; Jennings, unpubl. data). Larvae are thought to graze on algae, but they are rarely observed because they are often concealed in submergent vegetation or detritus (Jennings and Hayes 1994a). Most larvae metamorphose into juvenile frogs between July and September, although there are scattered observations of over wintering larvae in perennial ponds such as at the arboretum at Golden Gate Park in San Francisco (Jennings, unpubl. data). Post-metamorphic frogs grow rapidly by feeding on a wide variety of invertebrates including Amphipods, Isopods, Orthoptera, Isoptera, Hemiptera, Homoptera, Neuroptera, Coleoptera, Lepidoptera, Diptera, Hymenoptera and Arachnids, and Gastropoda (Stebbins 1972, Hayes and Tennant 1985, Baldwin and Stanford 1987). Most males reach sexual maturity in two years, whereas females reach sexual maturity in three. Frogs of both sexes may reach sexual maturity in a year if resources are sufficient (Jennings, unpubl. data), though it may require three to four years during extended periods of drought (Jennings and Hayes 1994a).

Based on limited field data, California red-legged frogs appear to live from 8 to 10 years in the wild (Jennings, unpubl. data). Adult frogs apparently eat a wide variety of animal prey including invertebrates, small fishes, frogs, and small mammals (Hayes and Tennant 1985, Arnold and Halliday 1986). In Santa Clara County, California red-legged frogs are probably active throughout most of the year, except for the coldest portions of the winter when temperatures drop below freezing.

California red-legged frogs have been observed in a number of aquatic and terrestrial habitats throughout their historic range. Larvae, juveniles, and adult frogs occur in natural lagoons, dune ponds, pools in or next to streams, streams, marshlands, sag ponds, and springs, as well as human-created stock ponds, secondary and tertiary sewage treatment ponds, wells, canals, golf course ponds, irrigation ponds, sand and gravel pits containing water, and large reservoirs (Storer 1925, Jennings 1988). The key to the presence of California red-legged frogs in these habitats is the presence of perennial, or near perennial, water and the general lack of introduced aquatic predators such as crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*), bullfrogs, green sunfish, bluegill (*L. macrochirus*) and centrarchid fishes such as largemouth bass (*Micropterus salmoides*).

If water at least several inches in depth is present and introduced aquatic predators are rare or absent, California red-legged frogs may be present. If the aquatic habitat favors introduced aquatic predators, then red-legged frogs will probably disappear from that particular site unless there is a nearby breeding site available that excludes the introduced predators. The habitats observed to contain the largest densities of red-legged frogs are associated with pools at least 27 inches deep with overhanging willows and an intermixed fringe of cattails (*Typha latifolia*), tules or sedges (Hayes and Jennings 1988). The continued survival of red-legged frogs in all aquatic habitats seems to be based on the existence of ponds, springs or pools that are apart from perennial streams. Such habitats provide the continued basis for successful reproduction and recruitment into nearby drainages that may lose frog populations due to stochastic events such as extreme flooding or droughts.

This species appears largely restricted to freshwater and slightly brackish water habitats. In lagoon systems and brackish water environments, field and laboratory observations indicate that California red-legged frogs cannot successfully reproduce and that larvae cannot survive (Jennings and Hayes 1990; Jennings, unpubl. data).

In addition to aquatic habitats, juvenile and adult California red-legged frogs use areas of riparian vegetation within a few yards of water. This species also uses small mammal burrows in or under vegetation, willow root wads, and the undersides of old boards and other debris within the riparian zone (Jennings, pers. obs.). Juvenile frogs are often observed sunning in the warm, surface-water layer associated with floating and submerged vegetation (Hayes and Tennant 1985). Adult frogs are mainly nocturnal and sit on stream banks or low hanging limbs of willow trees above pools where they can detect small mammal prey (Hayes and Tennant 1985, Jennings and Hayes 1994a).

Radio-telemetry studies conducted in lagoons and the lower reaches of streams along the Central Coast of California indicate that adult red-legged frogs will move within the riparian zone from well-vegetated areas to pools to hydrate during periods when many of the Central Coast streams are dry except for isolated pools (Rathbun et al. 1993). During wet periods, especially in the winter and early spring, red-legged frogs can move a mile between aquatic habitats. This movement often occurs across inhospitable frog habitat

like roads, open fields, and croplands. This type of movement, which is best documented in mesic coastal areas, may result in frogs occupying aquatic habitats isolated from known frog populations.

During each life stage, California red-legged frogs are prey for a wide variety of predators. Predators include: Black-crowned Night Herons (*Nycticorax nycticorax*), Bitterns (*Botaurus lentiginosus*), raccoons, garter snakes, bullfrogs, and centrarchid fishes (Jennings and Hayes 1994a, 1994b). Humans, especially children, may capture and harm juvenile and adult frogs, although these occurrences are considered rare (Miller et al. 1996).

The draft USFWS recovery plan for the California red-legged frog identifies eight "recovery units" that delineate geographic areas where recovery efforts to delist the frog will occur (USFWS 2000a). To facilitate recovery, core areas were defined within the recovery units to focus conservation actions (USFWS 2000a). These areas represent the areas where restoration is most feasible, reestablishment efforts are most likely to be successful, and natural recolonization is expected (USFWS 2000a). Activities within the core recovery areas will focus on; "1) protecting existing populations by reducing threats; 2) restoring and creating habitat that will be protected and managed in perpetuity; 3) surveying and monitoring populations and conducting research on the biology and threats of the subspecies; and 4) reestablishing populations of the subspecies within its historic range" (USFWS 2000a).

The California red-legged frog is thought to have been extirpated from the area encompassed by the Cross Valley service area. This belief is supported by the absence of any occurrences within this area in the California Natural Diversity Data Base (CNDDB 2000). The Cross Valley service area occurs within the Sierra Nevada Foothills Recovery Unit for the frogs, but is outside of the core areas within the recovery unit. The nearest core areas occur in western Merced and Fresno counties west of U.S. Interstate Highway 5 (USFWS 2000a). Since the Cross Valley service area is outside of these core areas, none of the proposed critical habitat for the red-legged frog occurs within the service area (USFWS 2000b).

Reptiles

Blunt-nosed Leopard Lizard *(Gambelia sila).* Federal Status: Endangered; State Status: Endangered, Fully Protected. The Blunt-nosed leopard lizard was originally described and named from a specimen collected from Fresno County in 1890. This lizard is a relatively large lizard of the family Iguanidae (Stebbins 1985). Adult males are typically 3.4 to 4.7 inches from snout to vent and weigh between 31.8 and 37.4 grams. The adult females are similar in length (range 3.4 to 4.4 inches), but weigh only 20.6 to 29.3 grams (Tollestrup 1982, Uptain et al. 1985).

The blunt-nosed leopard lizard was listed as Endangered by the USFWS in 1967 and by the state of California in 1971 (USFWS 1967, 1998). This species is endemic to the San Joaquin Valley (Montanucci 1970, Tollestrup 1979 in USFWS 1998) and is thought to

have once occurred from the Tehachapi Mountains in Kern County northward to Stanislaus County (USFWS 1998). The current range is thought to include scattered populations throughout the undeveloped land of the San Joaquin Valley and in the foothills of the Coast Range below 2,600 feet (Montanucci 1970, USFWS 1998).

The diet of the blunt-nosed lizard consists primarily of insects and other lizards (USFWS 1998). Insects consumed include grasshoppers and crickets in the Order Orthoptera and moths of the Lepidoptera. Other lizards consumed by blunt-nosed lizards include: side-blotched lizards (*Uta stansburiana*), coast horned lizards (*Phrynosoma coronatum*), California whiptails (*Cnemidophorus tigris*), and the spiny lizards (*Sceloporus spp.*) (USFWS 1998). Interspecific competition is hypothesized to occur between blunt-nosed lizards and California whiptails because they consume similar food items (Montanucci 1965, USFWS 1998).

Home ranges for male and female blunt-nosed lizards overlap, but vary in size with those for males being larger (females 0.25 to 2.7 acres, males 0.52 to 4.2 acres) (Tollestrup 1983). The lizards typically use abandoned tunnels constructed by ground squirrels and kangaroo rats, but will construct shallow, simpler tunnels when the density of small mammal burrows are low. Burrows are important structures that enable blunt-nosed lizards to moderate temperature extremes and avoid a wide-range of predators. Taxa preying upon blunt-nosed lizards include: snakes, shrikes, hawks, owls, eagles, squirrels, skunks, badgers, coyotes, and foxes (Montanucci 1965, Tollestrup 1979).

The seasonal, above ground activity of blunt-nosed lizards is primarily dependent on temperature with optimal activity occurring when air temperatures are between 74 and 104° F and ground temperatures are between 72 and 97° F (USFWS 1985a). Smaller lizards and young have a wider activity range than adults which results in them emerging from hibernation earlier than adults, remaining active later in the year, and being active earlier during the day than adults (Montanucci 1965). These temperature-related patterns result in adult lizards being active above ground from March or April through June or July. By the end of June or July, the majority of sightings are of subadult and hatchling lizards (USFWS 1998).

Breeding begins within a month of emergence from dormancy and typically lasts from the end of April through the beginning of June, but occasionally through the end of June. Adults are paired and frequently occupy the same burrow during the breeding period and up to several months after (Montanucci 1965, USFWS 1998). Two to six eggs are laid in June or July in a chamber excavated for a nest or in an existing burrow system. Adverse conditions can delay or halt reproduction, while variable environmental conditions may result in more than one clutch of eggs being produced per year (USFWS 1998).

The blunt-nosed leopard lizard inhabits open, sparsely vegetated areas within Nonnative Grassland, Valley Sink Scrub, Valley Needlegrass Grassland, and Alkali Playa communities on the floor of the San Joaquin Valley (Holland 1986). The lizards also inhabit the Saltbush Scrub communities within the foothills of the southern San Joaquin Valley and the adjacent Carrizo Plain. These classifications by Holland (1986) are

subsumed within the more general Alkali Desert Scrub and Annual Grassland habitat types described by Mayer and Laudenslayer (1988). Blunt-nose leopard lizards are typically absent where habitat conditions include steep slopes, dense vegetation, or areas subject to seasonal flooding (Montanucci 1965).

Populations of the bunt-nosed leopard lizard declined to levels warranting listing because of the conversion and degradation of suitable habitat (USFWS1998). Agricultural, urban, petroleum, mineral, and other development activitie altered an estimated 94 percent of the wildlands on the Valley floor by 1985 (USFWS 1985b). The recovery plans for the blunt-nosed leopard lizard identified habitat units that were considered essential for the continued persistence of viable populations within the San Joaquin Valley, but having no legal status equivalent to critical habitat the conversion of suitable habitat within these units continued (USFWS 1980, 1985a). Consequently, habitat disturbance, conversion, and fragmentation continue to be the greatest threats to blunt-nosed leopard lizard populations. Other direct and indirect effects result from automobile and off-highway vehicle traffic, livestock grazing, and pesticides (USFWS 1998). The recovery strategy for this species includes identifying and protecting existing habitat, determining the best habitat management practices, and conducting public information and education programs (USFWS 1985a, 1998).

All of the contractors that that comprise the Cross Valley CSA are within the boundaries of the historical distribution of the blunt-nosed leopard lizard. The conversion of land for agricultural purposes within the contract service area has led to a loss of patches of suitable habitat large enough likely to be inhabited by blunt-nosed leopard lizard. It is still possible, however, that some blunt-nosed leopard lizards remain in the Cross Valley CSA in patches of extant or marginal habitat. This is especially true in the Pixley Irrigation District, the Lower Tule Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District.

Giant Garter Snake (*Thamnophis gigas*). Federal Status: Threatened; State Status: Threatened. The giant garter snake is the largest member of the genus, Thamnophis, growing to lengths of 4.5 feet or greater. They emerge from over winter retreats in late March or early April and are active until the end of October. Mating occurs from April to May with females subsequently bearing from 10 to 46 live young in August (Fisher et al. 1994). The habitat components most important to the survival of giant garter snakes are: 1) water, including permanent water that persists through the summer months, 2) emergent aquatic vegetation and steep, vegetated banks for cover, and 3) an abundant food supply. Other important components are adjacent upland areas with small mammal burrows or other suitable winter retreats and habitat diversity including water.

Land development, especially the diking, channeling, and draining of wetlands has fragmented or eliminated much of the original habitat (Hansen and Brode 1980). Due to this loss of the snake's historical habitat, the giant garter snake's typical habitat today is valley floor canals and permanent and seasonal tule-cattail marshes. Giant garter snakes are also found in flooded rice fields, streams, and sloughs, especially with muddy bottoms (Stebbins 1985). Giant garter snakes could also utilize rock piles, small mammal

burrows, and other suitable sites adjacent to the water conveyance systems as hibernacula.

The giant garter snake was listed as Threatened by the USFWS in 1993. Once occurring from Buena Vista Lake southwest of Bakersfield in Kern County into Shasta County in the north, the species' present range is restricted to Fresno County north through the Central Valley to the vicinity of Gridley, Butte County (Hansen and Brode 1980). Giant garter snakes have been observed repeatedly near the Santa Fe Grade, north of Los Banos. Giant garter snakes have survived in a few wetlands managed as duck–hunting preserves or waterbird sanctuaries along the San Joaquin River, but the flooding of state and federal preserves in winter and spring, and draining by summer is opposite of what these snakes require (Fisher et al. 1994). In the northern Sacramento Valley, rice fields may provide the best habitat for these snakes, but the acreage dedicated for rice production is dependent on market conditions and water availability (Fisher et al. 1994).

The biggest risk to the persistence of viable populations of giant garter snakes is the continued conversion of its habitat through development (Fisher et al. 1994). Additional threats to the snake's existence are the elimination of the snake's prey items such as tadpoles, frogs, and small fish by pesticides and fertilizers, spills of pollutants into waterways, introduced predators, and incompatible grazing regimes (Fisher et al. 1994).

Land acquisition and the preparation and implementation of recovery actions are top priorities. The USFWS and the CDFG are expanding coordination efforts to protect giant garter snakes on Kesterson National Wildlife Refuge, San Luis National Wildlife Refuge, and Los Banos Wildlife Area all within Merced County; the Delevan National Wildlife Refuge in Colusa County; the Gray Lodge Wildlife Area in Butte County; and the Mendota Wildlife Area in Fresno County (Fisher et al. 1994).

The giant garter snake has likely been extirpated from the contract service area. The most recent sightings nearby are from the Mendota area in western Fresno County (CNDDB 2000). These sightings occurred in the 1970's.

Birds

California Condor (*Gymnogyps californianus*). Federal Status: Endangered; State Status: Endangered, Fully Protected. With a wingspan near 9.75 feet, the California Condor is the largest flying bird in North America. When mature, these birds measure 3.75 feet long and weigh more than 20 pounds (Verner 1978, Clendenen et al. 1994). The California Condor was listed as Endangered by the USFWS in 1967 and by the state of California in 1971. By 1982, only 22 birds remained in the remote wildlands of southern California (Clendenen et al. 1994). The last wild condor was brought into captivity in for captive breeding in 1987 (Snyder and Snyder 1989).

The delayed onset of reproduction (6 years) and low reproductive potential (typically fewer than four young produced in a lifetime) of California Condors predispose them to rapid population declines in response to even moderate levels of mortality (Verner 1978).

Studies have identified inordinate mortality largely attributable to humans as the primary agent in the decline of the condor. Shooting, indirect poisoning from lead shot, use of DDT in agricultural practices, and the general loss of habitat have been implicated as contributing to the decline of condors (Clendenen et al. 1994). The loss of habitat can take the form of changes in suitability of the landscape for foraging or nesting, as well as, the inability of the birds to use an area because of their intolerance for disturbance (Verner 1978).

The range of the California Condor prior to their capture for captive breeding was roughly a U-shaped range that included portions of Fresno, Tulare and Kern counties to the east, Los Angeles, Ventura, and Santa Barbara counties to the south, and San Luis Obispo, Monterey, San Benito, Santa Cruz, Merced, Santa Clara, and Stanislaus counties to the west (Verner 1978, Verner and Boss 1980). Non-breeders from August through December previously used the northwest sections of the range above the boundary between San Luis Obispo and Monterey counties. Likewise, non-breeders during the months of May through September once used habitats in Madera, Fresno, and northern Tulare counties (Verner 1978). The area used by foraging birds during a five-year study between 1982 and 1987 resembled the U-shaped pattern with the exception that it was restricted to the counties of Tulare, Kern, Los Angeles, Ventura, Santa Barbara, and San Luis Obispo (Meretsky and Snyder 1992). During that period, nest areas were found in the Traverse Ranges of Santa Barbara, Ventura, and Los Angeles counties and in the Sierra Nevada within Tulare County (Meretsky and Snyder 1992).

Meretsky and Snyder (1992) reported that all of the condors were familiar with the foraging zones within their range of nearly 5 million acres. They further noted that it was uncommon for the birds to move directly across the San Joaquin Valley, preferring to fly above the foothills and mountains around the valley. Foraging grounds were used on a seasonal basis; principal use of the Sierran zones occurred during the summer; the Tehachapi grounds were used most in the fall; the Hudson-San Emigdio zone peaked in late summer and early fall; and the Elkhorn-Carrizo and Hopper zones were used in spring (Meretsky and Snyder 1992). The seasonal shift in use appears to coincide with local changes food availability, but most birds travel widely among feeding zones throughout the year (Meretsky and Snyder 1992). The movements of condors were restricted during the breeding season apparently because of the need to frequently visit the nest (Meretsky and Snyder 1992).

California Condors feed exclusively on carrion comprised mostly of cattle, sheep, horses, deer, and ground squirrels, and depict a preference for deer and calves (Koford 1953). Condors presumably fed on dead marine mammals and spawned salmon in historic times (Clendenen et al. 1994). Condors search for carrion while soaring on thermals that occur during the warmer periods of the day. Clearance for landing and take-off are critical elements of suitable foraging habitat and fresh water pools suitable for drinking and bathing. Ridges with low vegetation make prime sites for spotting and feeding upon carcasses. Breeding condors are likely to conduct the majority of their foraging within 31 miles of their nests; therefore these resources must be well distributed throughout the landscape (Verner 1978).

Age of first reproduction in California Condors is thought to be at least 6 years and potentially eight years. Koford (1953) reported that among the main physical requirements for a condor nest site some of the most important are a large cavity in a rock or very large tree, suitable roosting perches, easy approach from the air, and protection from storms, winds, and direct sunshine. The birds most frequently nest within caves in cliffs in the coastal mountains of central California although two nests were found in giant sequoias in the southern Sierra Nevada.

The first two captive California Condors were released back into the wild in January 1992 (Meretsky and Snyder 1992). A second release occurred in December of 1992, but by September 1993, only four remained (Clendenen et al. 1994). These four were recaptured and moved to eastern Santa Barbara County where they were released along with 5 captive-bred fledglings in December 1993 (Clendenen et al. 1994).

The majority of the breeding habitat for condors occurs on land managed by the U.S. Department of Agriculture while the majority of the lands used for foraging are in private ownership. Successful public/private agreements are essential for the future recovery of the California Condor (Clendenen et al. 1994). Educational efforts to prevent shootings and research into sources of poisons implicated in the decline of the California Condor are also essential elements of the recovery strategy for this species.

Much of the Cross Valley CSA is in the historical range of the California Condor. Their previously mentioned tendency to circumnavigate the valley floor, and travel above the ridgelines of the ranges around the valley, however, makes it unlikely that Condors used the areas that encompass the Cross Valley CSA very often. Current land use and human encroachment within the contract areas of the Cross Valley CSA makes it highly unlikely that California Condors could forage there, even in the event that they eventually become reestablished in parts of their former range.

Bald Eagle (*Haliaeetus leucocephalus*). Federal Status: Proposed for Delisting; State Status: Endangered. The Bald Eagle is a large soaring bird, second in size only to the California Condor in North America. It weighs from 10 to 15 pounds, has a body length of 2.7 feet and a wingspan of 7 feet. Females are slightly larger than males, as is the case with most raptors. Bald Eagles are known to nest in all nine western states with concentrations of nesting pairs in California occurring around Shasta Lake and the Pit River (Detrich 1985). Past catastrophic declines in their populations have been attributed primarily to organachlorine pesticide use after World War II that lowered their productivity (Grier 1974). Other contributory factors include loss of habitat, human disturbance, severe weather, logging, shooting, industrial pollution, sedimentation, and acid waste.

Most of the annual food requirements of Bald Eagles are derived from or are obtained around aquatic habitats. The type of food consumed is typically proportional to its availability and most often consists of fish, water birds, and small to medium sized mammals. Because of their dietary association, nesting territories are usually found near

water. In California, Thelander (1973) found that 75 percent of the nest trees surveyed in 35 nesting territories were within 0.25 miles from a body of water. In situations where food supplies and roosts are distant from one another, travel lanes may be well defined. Flight distances and travel paths will vary depending on the juxtaposition of the communal roosting site, perch trees, and feeding areas.

Perches are used primarily during the day for resting, preening, or hunting, and may include human-made structures such as power poles, although natural perches are used most often. Edwards (1969) noted that valley or lowland roosts were used for perching during the day and as roosts in fair weather, whereas roosts in canyons were used almost exclusively when weather conditions were severe. Roosting areas will contain a night communal roosting tree that is easily accessible to the large birds, and tall enough to provide safety from threats from the ground. The number and quality of these roost trees determine the size and importance of the roost.

Wind currents and isolation are two additional habitat components that are important for Bald Eagles. Wind currents are instrumental for soaring birds, influencing their flight paths and selection of roost trees. Ridges, mountains, and tall trees all affect wind conditions and subsequent use by eagles. Bald Eagle wintering areas and roosts are usually found where human activity is infrequent and/or muted. Reactions to human intrusions vary depending on the circumstances, but isolation is still considered a necessary habitat component for Bald Eagles.

Millerton Lake is a known as an important wintering area for Bald Eagles (Suydam and Conrad 1985, Rhodehamel 1991). They have also been recorded at Hensley and Eastman Lakes. A pair of Bald Eagles nested near Eastman Lake from 1993 to 1997 (CNDDB 2000). Bald Eagles are likely to occur only as a rare winter migrant in the Cross Valley CSA.

Swainson's Hawk (Buteo swainsoni). Federal Status: None; State Status: Threatened. The Swainson's Hawk is a large soaring bird of open habitats. It has a wingspan of approximately four feet, and as in most birds of prey, the female is slightly larger than the male. The coloration is highly variable from light to rufous to entirely dark birds. Swainson's Hawks are most easily distinguished from other members of its genus, such as the familiar Red-tailed Hawk (*B. jamaicensis*), by their more slender body and narrow, pointed, and slightly upturned wings.

Swainson's Hawks were once one of the most common birds of prey in the grasslands of California. Its populations have declined at least 90% since 1990, and are still believed to be declining (Thelander 1994). They once nested in the majority of the lowland areas in the state. Currently its nesting range is primarily restricted to portions of the Sacramento and San Joaquin Valleys and northeast California (Bloom 1980). It was listed as Threatened by the State of California in 1983.

Swainson's Hawks require large amounts of foraging habitat, preferably grassland or pasture habitats. Their preferred prey items are voles (*Microtus* sp), gophers, birds, and

insects such as grasshoppers (Estep 1989). They have also adapted to some croplands, particularly alfalfa, but also hay, grain, tomatoes, beets and other row crops (Estep 1989). Crops such as cotton, corn, rice, orchards, and vineyards are not suitable since they either lack suitable prey or the prey is unavailable to the Swainson's Hawks due to the crops structure.

In the Central Valley, Swainson's Hawks are generally tied to riparian habitat for nesting sites (Bloom 1980). A few pairs nesting in Tulare and Kings County utilize eucalyptus trees and nest outside riparian areas (CNDDB 2000).

In the fall, Swainson's Hawks collect in flocks called kettles, sometimes in large numbers, and migrate together to South America. Kettles can occasionally be seen in the valley foraging behind tractors or harvesters, hunting mice and insects that have been disrupted.

All of the contractors that that comprise the Friant Division are within the boundaries of the historical distribution of the Swainson's Hawk. The conversion of land for agricultural purposes within the contract service area and the predominance of crops that are unsuitable foraging habitat, such as cotton, orchard, and vineyards, has led to a loss of patches of suitable habitat large enough likely to be inhabited by Swainson's Hawks. Still, Swainson's Hawks are known to still be present within the boundaries or adjacent to the Pixley Irrigation District, Alpaugh Irrigation District, the Atwell Water District and the Lower Tule Irrigation District (CNDDB 2000).

American Peregrine Falcon (*Falco peregrinus anatum*). Federal Status: Delisted; State Status: Endangered. The Peregrine Falcon occurs throughout much of the world, and is known as one of the fastest flying birds of prey. They prey almost entirely on birds, which they kill while in flight. These falcons nest on ledges and caves on steep cliffs. In California, they are known to nest along the entire coastline, the northern Coast and Cascade Ranges and the Sierra Nevada. During winter and periods of migrations they can be found throughout the state. Peregrines are most likely to be encountered though, in coastal or inland marsh habitats where large numbers of waterfowl and shorebirds concentrate.

A severe decline in populations of the widespread North American subspecies *F. p. anatum* began in the late 1940's. This decline was attributed the accumulation of DDE, a metabolite of the organochlorine pesticide DDT, in aquatic food chains (Thelander 1994). When concentrated in the bodies of predatory birds such as the Peregrine Falcon, Bald Eagle, Brown Pelican, and Osprey it led to reproductive effects such as the thinning of eggshells.

The American Peregrine Falcon was listed as Endangered by the USFWS in 1970 and by the State of California in 1971. Intensive efforts to protect Peregrine Falcons were initiated by biologists from the Santa Cruz Predatory Bird Research Group in 1975. This group removed the fragile eggs prom the nests of wild falcons and replaced them plastic substitutes. After carefully hatching the eggs in incubators and raising the chicks for two

weeks, they were replaced to their original nests. Recovery efforts also included the banning of DDT in North America and captive breeding programs. These efforts led to over 120 pairs of Peregrine Falcons by 1992 (Thelander 1994). The USFWS removed the American Peregrine Falcon from the Endangered species list in 1999, though the State of California has yet to do so.

Appropriate breeding habitat for the Peregrine Falcon, especially the cliffs they require, is absent from the Cross Valley CSA. Migrants and wintering birds may occasionally pass through some of the Cross Valley CSA, though in the San Joaquin Valley they are more likely to be concentrate in areas of high waterfowl and shorebird use such as the Tulare Lake Basin and the wetlands that occur from the Mendota Wildlife Area north through the Grasslands wetland complex in Merced County.

Least Bell's Vireo (*Vireo bellii pusillus*). Federal Status: Endangered; State Status: Endangered. The Least Bell's Vireo is a small songbird, measuring about 4.75 inches in length, inhabiting riparian vegetation (Franzreb et al. 1994). This subspecies is one of four subspecies of Bell's Vireo (Bent 1950, Franzreb 1987). The Arizona Bell's Vireo (*Vireo bellii arizonae*) is the only other subspecies breeding in California (Franzreb et al. 1994).

Bell's Vireos were once widespread throughout the Sacramento and San Joaquin Valleys extending into the Sierra Nevada up to about 2000 feet in elevation (Gaines et al. 1990). They were once also common in the coastal valleys and foothills from Santa Clara County south, below the 4000-foot elevation in valleys east of the Sierra Nevada, and along the Mojave and Colorado Rivers (Gaines et al. 1990).

The Least Bell's Vireo was listed as Endangered by the state of California in 1980 and by the USFWS in 1986 (USFWS 1986). The species has been extirpated from the Sacramento and San Joaquin valleys as well as most of its range (Franzreb 1987). Current belief is that only about 400 pairs exist north of the U.S. – Mexican border and the species is nearing extinction in California (Franzreb 1987, Franzreb et al. 1994).

The Least Bell's Vireo uses dense thickets of willows and low bushes along perennial and ephemeral streams, and wet areas and thick stands of alders in mesic areas (Bent 1950, Gaines et al. 1990). These vireos were most often observed foraging low to the ground in riparian associated habitats, but have also been observed foraging in grapevines, valley oaks, and live oaks (Bent 1950).

Least Bell's Vireos nest within thick riparian vegetation often placing nests less than four feet from the ground (Bent 1950, Franzreb 1987). Peak egg-laying period is May and early June with the production of four eggs on average (Gaines et al. 1990). The production of fledglings is substantially less than four, particularly in degraded habitats (Franzreb 1987). Both the males and females care for the young until they fledge at 11 to 12 days (Gaines et al. 1990). The Least Bell's Vireo suffers from nest predation and parasitism that is facilitated by their habit of building nests low to the ground and singing from the nest (Franzreb 1987, Gaines et al. 1990).

The decline in their populations has resulted from the combined effects of loss of riparian habitat, parasitism by Brown-headed Cowbirds (*Molothrus ater*), urban development, water projects, invasion of exotic plants, and general practices that remove stream-side nesting habitat (Bent 1950, Franzreb et al. 1994). The USFWS designated 38,000 acres of lands in southern California as critical habitat in 1994. Recovery efforts are focused on protecting existing habitat within these lands in Santa Barbara, Ventura, Los Angeles San Bernardino, Riverside, and San Diego counties. Protecting the remaining breeding population from parasitism, predation, chemical pollution, and disturbance by humans and livestock is another complex component of the recovery efforts for the Least Bell's Vireo (Franzreb 1987, Franzreb et al. 1994).

There are no recent records of Least Bell's Vireo within the Cross Valley CSA (CNDDB 2000). The Cross Valley CSA is north of the lands designated as critical habitat for the Least Bell's Vireo by the USFWS and is outside the boundaries of current recovery efforts.

Mammals

San Joaquin Antelope Squirrel (Ammospermophilus nelsoni). Federal Status: None; State Status: Threatened. The San Joaquin antelope squirrel is a small ground squirrel about six inches in length. They are distinguished by a white stripe on its sides and a white belly and eyelids and a flat tail, which it often folds over its back. They feed primarily on insects, but will also eat green vegetation, fungi, and on occasion seeds (Thelander 1994).

They occur in small colonies of six to eight individuals in spare arid grasslands and shrublands. They are most common in areas with a sparse to moderate cover of shrubs such as saltbushes, California ephedra, bladderpod, and goldenbushes (USFWS 1998). They require loose friable soils in areas free of flooding for their burrows. San Joaquin antelope squirrels are often found in association with the giant kangaroo rat (*Dipodomys ingens*), whose burrows they often occupy.

San Joaquin antelope squirrels historically occurred on the western and southern portions of the Tulare Basin, San Joaquin Valley, Cuyama Valley, and the Carrizo and Elkhorn Plains. They ranged from western Merced County, southward along the west side of the San Joaquin Valley to its southern end. They occurred on the valley floor in Kern County and along the eastern edge of the Valley northward to near Tipton, Tulare County (USFWS 1998). Currently they are restricted to the Coast Range on the western edge of the Valley, the vicinity of Lokern and Elk Hills in western Kern County, and on the Carrizo and Elkhorn Plains of eastern San Luis Obispo County (USFWS 1998).

The causes of decline include habitat loss and fragmentation due to agriculture and petroleum extraction as well as rodenticide use (Thelander 1994). The State of California listed the San Joaquin antelope squirrel as a rare species in 1980 and later reclassified it as Threatened.

The Lower Tule Irrigation District, Pixley Irrigation District, Alpaugh Irrigation District, and Atwell Island Water District are all within the historic range of the San Joaquin antelope squirrel. This species, however, no longer occurs in the any of the Cross Valley CSA (Thelander 1994, USFWS1998).

Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*). Federal Status: Endangered; State Status: Endangered. The Tipton kangaroo rat is one of three geographically separated subspecies of San Joaquin kangaroo rat (*Dipodomys nitratoides*), the others being the Fresno kangaroo rat (*D. nitratoides exilis*) and the short-nosed kangaroo rat (*D. nitratoides brevinasus*) (Brylski and Roest 1994, Brylski et al. 1994, USFWS 1998). Fresno and Tipton kangaroo rats once occupied contiguous geographic ranges within the Tulare Basin and the southeastern half of the San Joaquin Basin in the San Joaquin Valley (USFWS 1998). The short-nosed kangaroo rat inhabits the western portions of the Tulare Basin, the upper Cuyama Valley, and Carrizo Plain as well as the foothills and basins along the west side of the San Joaquin Valley south of Los Banos in Merced County (USFWS 1998).

The Tipton kangaroo rat was listed as Endangered by the USFWS in 1988 and by the state of California in 1989 (USFWS 1988). The historic distribution of the Tipton kangaroo rat covered about 1.7 million acres on the floor of the Tulare Basin. By 1985, the area inhabited had been reduced to about 63,000 acres and remains at about that level (USFWS 1998). Their present distribution is comprised of scattered, isolated populations in Tulare and Kern counties (USFWS 1998).

Seeds of annual and perennial grasses, annual forbs, and woody and semi-woody shrubs are the primary diet of the Tipton kangaroo rat (USFWS 1998). Insects comprise a small part of their diet, probably similar to that reported for Fresno kangaroo rats (Koos 1979, USFWS 1998). Tipton Kangaroo rats may have to forage on the surface for more of the year instead of relying on underground caches because damp soil conditions where they live cause seeds to sprout or mold (Culbertson 1946, Brylski et al. 1994).

Little is known about the mating system of free-ranging Tipton kangaroo rats, but it is thought that this aspect of their biology is similar to that of Fresno Kangaroo rats (USFWS 1998). Reproduction in Fresno kangaroo rats begins in late February, peaks in April and continues into September (Brylski and Roest 1994, USFWS 1998). Local population sizes are highly variable (USFWS 1998). Similar to Fresno kangaroo rats, females mature at an early age; females are capable of producing more than one litter a year; annual turnover rates can be high; and precipitation patterns most likely affect critical resources (USFWS 1998). Densities estimates for Tipton kangaroo rats vary from less than 0.4 to 35.7 rats per acre and are probably influenced by site, season, weather patterns, and intra- and interspecific competition (USFWS 1998).

Tipton kangaroo rats occupy arid-land communities on alluvial fan and floodplain soils having level or near-level topography with elevated soil structures such as mounds, berms, or embankments for burrows (Brylski et al. 1994, USFWS 1998). Apparently, the

Relictual Interior Dune Grassland and Sierra-Tehachapi Saltbush Scrub communities supported the best historic populations (USFWS 1998). Iodine bush shrubland and Valley saltbush scrub are two communities occupied in present times and are typically comprised of one or more species of sparsely scattered woody shrubs and a ground cover of native and non-native grasses and forbs (USFWS 1998). Burrows are usually located in open areas. While Tipton kangaroo rats can re-colonize scattered areas of seasonally flooded habitat, areas not subject to flooding are important for permanent occupancy (USFWS 1998).

The conversion of native habitat to accommodate agricultural uses is the leading cause of the decline in Tipton kangaroo rat populations (USFWS 1998). The Central Valley and State Water Projects produced a dependable supply of water for irrigation farming. By the mid 1980s, only about three percent of the land base in the Tulare Basin was undeveloped (USFWS 1998). Use of rodenticides to control California ground squirrel populations most likely contributed to the decline in Tipton kangaroo rats. The continued conversion, degradation, and fragmentation of suitable habitat are major threats to the future persistence of this species as are periodic flooding, the use of rodenticides, and competition with Heermann's kangaroo rats that are more successful in maintaining populations in a fragmented landscape (Brylski et al. 1994, USFWS 1998).

Recovery efforts for this species are focused on habitat management and the protection of areas of natural or restored habitat in a configuration that will perpetuate viable populations. Other recovery actions include the design and implementation of a range-wide program to monitor the population and the expansion or continuance of studies into habitat management and interspecific competition (USFWS 1998).

Portions of the Lower Tule Irrigation District, the Pixley Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District are within the boundaries of the historic distribution of the Tipton kangaroo rat. The conversion of land for agricultural purposes within the contract service area has led to a loss of patches of suitable habitat large enough likely to be inhabited by Tipton kangaroo rat. Extant populations, however, are known to occur within the Pixley District within and in the vicinity of the Pixley National wildlife Refuge (USFWS 1998, CNDDB 2000). It is possible that other Tipton kangaroo rat populations remain in the Cross Valley CSA in patches of extant or marginal habitat in the Pixley Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Status: Endangered; State Status: Threatened. The kit fox is the smallest canid species in North America and the San Joaquin kit fox is the largest subspecies. The San Joaquin kit fox was listed as endangered by the USFWS (USFWS 1967) in 1967 and by the State of California in 1971. The evolutionary and taxonomic relationships among small North American foxes were recently examined (Dragoo et al. 1990, Mercure et al. 1993) and the conclusion was made that of the traditional subspecies of the kit fox, the San Joaquin Valley population is most distinct and should be considered a subspecies.

Grinnell et al. (1937) believed that by 1930 the range of the San Joaquin kit fox had been reduced by half. They described the range prior to 1930 as including most of the San Joaquin Valley from southern Kern County north to Tracy in San Joaquin County on the west side of the Valley and up to La Grange in Stanislaus County on the east side. No comprehensive survey of its entire historical range has been completed, but local surveys, research projects, and incidental sightings indicate that kit foxes currently inhabit larger "areas of suitable habitat on the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains from southern Kern County north to Contra Costa, Alameda, and San Joaquin counties on the west, and near La Grange, Stanislaus County on the east side of the Valley (USFWS 1998). USFWS (1998) also reported kit foxes occurring "westward into the interior coastal ranges in Monterey, San Benito, and Santa Clara counties (Pajaro River Watershed), in the Salinas River watershed, Monterey and San Luis Obispo counties, and in the upper Cuyama River watershed in northern Ventura and Santa Barbara counties and southeastern San Luis Obispo County. USFWS (1998) report the results of a study conducted by the State of California that found about 85 percent of the San Joaquin kit fox population in 1975 occurred within six counties: Fresno, Kern, Kings, Monterey, San Luis Obispo, and Tulare. About half the population could be found in Kern (41%) and San Luis Obispo (10%) counties.

Kit fox mortality results from many sources. Natural sources include predation, starvation, drowning, and disease. Human induced factors include shooting, trapping, poisoning, electrocution, collisions with vehicles, and suffocation (USFWS 1998). Loss of habitat from urban, agricultural, and industrial development are the principal factors in the decline of the San Joaquin kit since at least the 1950s (Morrell 1975). The USFWS (1980) estimated that by 1958, 50 percent of the Valley's original natural communities had been converted. The completion of the Central Valley Project and the State Water Project, that diverted and imported new water supplies for agriculture, contributed to an estimated 34 percent loss of natural lands between 1959 and 1969 so that by 1979, only about 7 percent of the San Joaquin Valley floor's original wildlands south of Stanislaus County remained untilled and undeveloped (USFWS 1980, USFWS 1989).

Subpopulations of the San Joaquin kit fox appear to be increasingly isolated from one another due to other developments within its range including: cities, aqueducts, irrigation canals, surface mining, road networks, petroleum fields, other industrial projects, power lines, and wind farms (USFWS 1998). These actions singly and cumulatively compress and constrict the San Joaquin kit fox into fragmented areas, varying in size and quality. The isolation of subpopulations can lead to increased rates of extinction (Gilpin and Soule 1986) due to the effects of inbreeding, genetic drift, Allee effects (Dennis 1989, Fowler and Baker 1991), intra- and interspecific competition, and catastrophic occurrences in the local environment.

Human actions or natural disturbances that contribute to the fragmentation and subsequent isolation of San Joaquin kit fox populations or their habitat have the potential to move the species closer to extinction. Kit foxes have been observed to disperse across disturbed habitats such as agricultural fields, oil fields, rangelands, highways, and

aqueducts (Scrivner et al. 1987; see USFWS 1998), but maintaining movement corridors to connect subpopulations remains an important goal of recovery efforts for this species.

Interspecific competition occurs between nonnative red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*) and kit foxes. Nonnative red foxes may invaded and occupy historic kit fox habitats, compete for resources, and limit recover efforts. Coyotes are highly adaptable to disturbed environments and may out compete kit foxes for available resources as well as kill them opportunistically (White and Garrott 1997, Cypher and Spencer 1998). Predation by large carnivores may account for the majority of the annual adult mortality rate observed among San Joaquin kit fox in some areas (Berry et al. 1987). The coyote population on the Naval Petroleum Reserves in California was reduced in an attempt to enhance the kit fox population, but was ineffective (Cypher and Scrivner 1992).

The San Joaquin kit fox is primarily nocturnal and typically occurs in annual grassland or mixed shrub/grassland habitats throughout low, rolling hills and in the valleys. The diet of kit foxes varies geographically, seasonally, and annually, but throughout most of its range the diet consists primarily of kangaroo rats (*Dipodomys* spp.), pocket mice (*Perognathus* spp.), white-footed mice (*Peromyscus* spp.), San Joaquin antelope squirrels (*Ammospermophilus nelsoni*), California ground squirrels (*Spermophilus beecheyi*), rabbits (*Sylvilagus* spp.), black-tailed hares (*Lepus californicus*), ground nesting birds, and insects, (Morrell 1972, Orloff et al. 1986, Scrivner et al. 1987, Cypher and Spencer 1998).

In arid regions, herbivores are dependent on annual plant production that is strongly influenced by the rates and timing of precipitation (Beatley 1969). While vegetation responds rapidly to precipitation in these systems, small mammal populations may take up to a year to exhibit a numerical response. Kit fox abundance specifically relates to rainfall amounts during the growing season for plants two years earlier (Dennis and Otten 2000) because another lag exists between the increase or decline in herbivore populations and the regulation of kit fox populations (Cypher and Scrivner 1992, White and Garrott 1997) expressed chiefly as variation in annual adult reproductive success and survival (White and Ralls 1993, White et al. 1996).

Breeding occurs from December through February with pups usually born in February or March. One litter per year, with an average of four pups per litter, is typical (McGrew 1979). The pups remain with the parents until June or July at which time the juveniles usually disperse distances of 0.6 to 4.4 miles. A six year study at Elk Hills Naval Petroleum Reserves in California reported average dispersal distances of 5.0 ± 0.9 miles (Scrivner et al. 1987).

Home range is the area an animal regularly frequents in its daily activities of foraging, roaming, resting, and caring for young. For carnivores in general, home range size is usually related to prey availability. The home range size of kit foxes in the southern portion of their range is about 1 to 2 mi^2, and individual home ranges overlap extensively (Morrell 1972, Ralls et al. 1990, Spiegel and Bradbury 1992). Kit foxes may be solitary

from mid-summer through late fall and then occur in family groups from late fall through early summer. According to K. Ralls (USFWS 1998), adult pairs may share home ranges but not necessarily the same den outside of the breeding season.

Densities of San Joaquin kit foxes are influence by the quantity, suitability, and configuration of habitats, and annual variability in precipitation. Density estimates are also subject to variability as a result of differences in methodology, observer bias, and natural background variation. Density estimates taken alone can also be misleading because they provide no information about the reproductive success or age structure within the population. The best long-term data available is for the Naval Petroleum Reserve in California. The USFWS (1998) reports that the mean densities from 1981 to 1993 for Reserve-1 and Reserve-2 were 0.12 per km^2 and 0.38 per km^2, respectively. In both locales, the maximum density was 0.72 per km^2.

The kit fox requires underground dens for temperature regulation, shelter, reproduction, and predator avoidance (Golightly and Ohmart 1984). Kit foxes commonly modify and use dens constructed by other animals and human-made structures (USFWS 1998). Dens are usually located on loose-textured soils on slopes less than 40 degrees (O'Farrell et al. 1980), but the characteristic of San Joaquin kit fox dens varies across the fox's geographic range in regard to the number of openings, shape, and the slope of the ground on which they occur (USFWS 1998). Natal or maternal dens tend to be found on slopes of less than six degrees (O'Farrell and McCue 1981). Kit foxes change dens often using numerous dens each year. Monitoring the movement of foxes using radio telemetry portrayed that foxes use individual dens for a median of 2 days before moving to a different den (USFWS 1998). Avoidance of coyotes has been provided as a probable hypothesis to explain this frequent change of dens. Orloff et al. (1986) reported individual foxes using more than 20 den sites annually and family groups using as many as 43. In another study, a single animal used 70 different dens over a two-year period (USFWS 1998).

The recovery strategy for the San Joaquin kit fox operates on two distinct levels; 1) the establishment of a viable complex of kit fox populations (metapopulation) on private and public lands throughout its geographic range and 2) the acquisition of new and better information to aid restoration and management efforts. The metapopulation strategy is dependent on the enhanced protection and management of three geographically distinct core populations: 1) Carrizo Plain Natural Area in San Luis Obispo County; 2) Natural lands of western Kern County inhabited by kit foxes; and 3) the Ciervo-Panoche Natural Area of western Fresno and eastern San Benito counties. These populations are connected to a degree by rangelands with kit foxes occurring at varying densities, providing linkages between the core populations.

The strategy that focuses on new and better information for restoration and management stresses the collection of data on the distribution and status of the fox throughout its range. Other areas of focus include: demographic information for foxes occupying natural, agricultural, residential, and industrial lands; relations between prey populations and kit fox population dynamics; interspecific interactions between kit foxes and other

native and nonnative carnivores; and the direct and indirect relations between land use practices and kit fox survival and reproductive success.

All of the contractors that that comprise the Cross Valley CSA are within the boundaries of the historical distribution of the San Joaquin kit fox. The conversion of land for agricultural purposes within the contract service area has led to a loss of patches of suitable habitat large enough likely to be inhabited by San Joaquin kit foxes. It is still possible, however, that some San Joaquin kit fox remain in the Cross Valley CSA in patches of marginal habitat. This is especially true in the Lower Tule Irrigation District, the Pixley Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District. San Joaquin kit foxes have been recorded within or immediately adjacent to these districts within the past ten years (CNDDB 2000).

SENSITIVE SPECIES AND SPECIES-OF-CONCERN

Plants

A total of 25 plant species identified as federal sensitive plants have been determined to potentially occur in the four counties containing the Cross Valley CSA within the range of plant communities below 1000 feet in elevation (Table 3). Accounts of these species will not be presented here. Refer to Appendix B for information pertaining to the occurrence of these species within each water district of the Cross Valley CSA.

Animals

A total of 35 animal species identified as State Species-of-concern or State Fully Protected have been observed to occur or are expected to occur within the four counties containing the Cross Valley Contractors (Table 4). A Brief account of these species is provided below. Refer to Appendix D for information pertaining to the occurrence of these species within each water district of the Cross Valley Contractors.

Western Spadefoot (*Scphiopus hammondi*). Federal Status: None; State Status: Species of Special Concern. The western spadefoot is a toad that inhabits grassland habitats of central California and the southern California coast. It requires temporary pools of water, lacking predators such as fish, bullfrogs, or crayfish, for egg laying (Jennings and Hayes 1994a). It is associated with vernal pools in the Central Valley. Vernal Pool habitat has been mostly eliminated from the Cross Valley CSA by agricultural and urban developments. Western spadefoot may persist in the Cross Valley CSA if any vernal pools or pool remnants remain.

Western Pond Turtle (*Clemmys marmorata*). Federal Status: None; State Status: Species of Special Concern. The western pond turtle is a medium-sized brown or olive-colored aquatic turtle, and is found west of the Sacramento-San Joaquin Delta, and south to northern Baja, except in desert areas. The pond turtle is normally found in and along riparian areas, although gravid females have been reported up to a mile away from water in search of an appropriate nest sites. The preferred habitat for these turtles includes

ponds or slow-moving water with numerous basking sites (logs, rocks, etc.), food sources (plants, aquatic invertebrates, and carrion), and few predators (raccoons, introduced fishes, and bullfrogs). Juvenile and adult turtles are commonly seen basking in the sun at appropriate sites, although they are extremely wary animals and often dive into the water at any perception of danger. Western pond turtles are likely be present in some of the various rivers, creeks, sloughs, and even canals and ditches that cross the Cross Valley CSA.

California Horned Lizard (*Phyrnosoma coranatum frontale*). Federal Status: None; State Status: Species of Special Concern. This ant specialist that once inhabited much of the Central Valley has disappeared from much of its former range. California horned lizards occupy loose sandy loam and alkaline soils in a variety of habitats including chaparral, grasslands, saltbush scrub, coastal scrub, and clearings in riparian woodlands. They primarily eat insects such as ants and beetles. Their population decline is mainly attributed to conversion of land for agricultural purposes. The human introduction of non-native Argentine ants, which are inedible to horned lizards and tend to displace the native carpenter ants, is another factor in their decline. There are no recent records of California horned lizards occurring within the Cross Valley CSA (Jennings and Hayes 1994a, CNDDB 2000). They may persist, however, in some isolated patches of undisturbed habitat.

Silver Legless Lizard (*Anniella pulchra pulchra*). Federal Status: None; State Status: Species of Special Concern. This unusual lizard is found in sandy or loose loamy soils under the sparse vegetation of beaches, chaparral, pine-oak woodland, or under sycamores, cottonwoods, or oaks that grow on stream terraces. Legless lizards forage for insects and spiders underneath leaf litter or underneath sandy soil, usually at the base of shrubs or other vegetation (Jennings and Hayes 1994a). Their adaptation for burrowing, which requires soils with a high sand fraction, makes legless lizards vulnerable to ground disturbing activities such as agriculture. There are a few records for silver legless lizard within the Cross Valley CSA, and it is possible that they may persist in the upland portions of streambeds.

San Joaquin Whipsnake (*Masticophis flagellum ruddocki*). Federal Status: None; State Status: Species of Special Concern. The San Joaquin whipsnake is a subspecies of the coachwhip, which is a snake related to racers. They occur on the west side of the San Joaquin Valley and on the Valley floor in Kern County in sparse grasslands and saltbush scrub communities with little or no trees (Jennings and Hayes 1994a). They require the presence of mammal burrows for refuge, temperature regulation, and possibly egg laying. The lands within the contract service area are likely to be too disturbed to provide habitat for San Joaquin whipsnakes.

American White Pelican (*Pelecanus erythrorhynchos*). Federal Status: None; State Status: Species of Special Concern. White Pelicans are very large fish-eating birds almost always occurring in large flocks. They fish from the surface of the water, scooping prey in their large pouches. White Pelicans formerly bred in Tulare Lake. Currently they are present in the Central Valley in the late summer, after breeding birds

from the Great Basin disperse, through the winter. They are unlikely to occur in the Cross Valley CSA.

Double-crested Cormorant (*Phalacrocorax auritus*). Federal Status: None; State Status: Species of Special Concern. This inland nesting cormorant is fairly common on riverine and lacustrine habitats in the Central Valley. It occurs at Millerton Lake, along the San Joaquin River, and possibly in other rivers as well.

Western Least Bittern (*Ixobrychus exilis hesperis*). Federal Status: None; State Status: Species of Special Concern. This small secretive heron inhabits dense emergent wetlands. Least Bitterns once bred in much of the Central Valley, but reductions in marsh habitat have reduced their range considerably. In the San Joaquin Valley, they are currently limited to pockets of habitat in the Tulare Lake Basin and the wetlands that occur from the Mendota Wildlife Area north through the Grasslands wetland complex in Merced County. They are unlikely to occur in the Cross Valley CSA.

White-faced Ibis (*Plegadis chihi*). Federal Status: None; State Status: Species of Special Concern. White-faced Ibis chiefly occur in marsh habitats, particularly where stretches of cattails or tules are interspersed with areas of open water (Grinell and Miller 1944). They are also known to feed in flooded agricultural fields, particularly alfalfa and rice. White-faced Ibis in the San Joaquin Valley mainly occur in areas of expansive wetland in the Tulare Lake Basin and the wetlands that occur from the Mendota Wildlife Area north through the Grasslands wetland complex in Merced County. Flocks of White-faced Ibis probably forage in flooded fields within the Cross Valley CSA from time to time.

Osprey (*Pandion haliaetus*). Federal Status: None; State Status: Species of Special Concern. This raptor feeds almost exclusively on fish. The Osprey is considered a migrant in this part of the state. Migratory Osprey could occur any where in the Cross Valley CSA where there are fish-bearing waters.

White-tailed Kite (*Elanus leucurus*). Federal Status: None; State Status: Fully Protected Species. This species prefers habitats with low ground cover and variable tree growth. Kite nests are built near the tops of oaks, willows, or other dense broad-leafed deciduous tress in partially cleared or cultivated fields, grassy foothills, marsh, riparian, woodland, and savannah. Kites prey primarily on small rodents (especially the California vole), but also feed on birds, insects, reptiles, and amphibians. Once considered Endangered, the White-tailed Kite is now fairly common. They could occur throughout the Cross Valley CSA.

Northern Harrier (*Circus cyaneus*). Federal Status: None; State Status: Species of Special Concern. The Northern Harrier is commonly found in open grasslands, agricultural areas, and marshes. Nests are built on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects by flying low and slow in a traversing manner utilizing both sight and sound to detect prey items. Northern Harriers are

common in the Central Valley, especially during winter, and may occur throughout the Cross Valley CSA.

Sharp-shinned Hawk (*Accipiter striatus*). Federal listing status: None; State listing status; Species of Special Concern. The Sharp-shinned Hawk is commonly found in dense woodland or riparian habitats bordering open areas. Sharp-shinned Hawks typically pursue small birds in semi-open country, at the edges of open woodlands, in clearings, along hedgerows, shorelines, or along passerine migration corridors. Nest sites are usually within 90 meters of a water source and located in dense stands of even-aged trees on north facing slopes.

Sharp-shinned Hawks move through the contract service area in spring and fall, during periods of migration. They may also spend portions of the winter months foraging for small birds and other prey in orchards and vineyards in the Cross Valley CSA.

Cooper's Hawk (*Accipiter cooperii*) Federal listing status: None; State listing status; Species of Special Concern. The Cooper's Hawk is a larger accipiter than the Sharp-shinned Hawk and thus, this species can prey upon medium-sized birds (e.g., jays, doves, and quail) and occasionally takes small mammals and reptiles. The Cooper's Hawk prefers landscapes where wooded areas occur in patches and groves which facilitates the ambush hunting tactics employed by this species. Breeding pairs in California prefer nest sites within dense stands of live oak woodland or riparian areas and prey heavily on young birds during the nesting season.

Like the Sharp-shinned Hawk, Cooper's Hawks would only be present on the site for short periods in winter and migration.

Ferruginous Hawk (*Buteo regalis*). Federal listing status: None; State listing status: Species of Special Concern. Ferruginous Hawks winter in open habitats throughout central and southern California. This species prefers the non-native grassland habitats that ring the valley floor though they may occasionally utilize plowed fields that occur in the Cross Valley CSA in the winter.

Golden Eagle (*Aquila chrysaetos*). Federal listing status: None; State listing status: Species of Special Concern, Fully Protected. The Golden Eagle is an uncommon permanent resident and migrant in California. Golden Eagles forage upon a variety of prey, but show a preference for rabbits and rodents. The home range of breeding pair of eagles may include a number of alternate nests, usually located on cliffs, in large trees, or on high-tension towers. Only one of these sites is used each year for breeding. Golden Eagles, their nests, and eggs are fully protected in the state of California by the California Department of Fish and Game. In addition, Golden Eagles and their nests are federally protected under the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

Golden Eagles prefer desert scrub, foothill woodland, and the non-native grassland habitats that ring the San Joaquin Valley floor. They may occasionally utilize plowed fields that occur in the Cross Valley CSA during the winter.

Merlin (*Falco columbarius*). Federal listing status: None; State listing status; Species of Special Concern. Merlin are small falcons that prey mostly on birds that they catch while in flight. They are a rare migrant and winter visitor to the Central Valley. The project site could provide marginal foraging habitat for this species, and its presence there is expected to be incidental at most.

Prairie Falcon (*Falco mexicanus*). Federal listing status: None; State listing status; Species of Special Concern. This large falcon is found in grasslands, deserts, and other open habitats in southwestern North America. Sheltered cliffs required for nesting are absent. Prairie Falcons nesting in nearby areas, as well as wintering or migrant falcons could use the fallowed or recently plowed fields within the Cross Valley CSA for foraging, though they are more likely to be found in desert scrub and grassland habitats.

Western Snowy Plover (*Charadrius alexandrinus nivosus*). Federal listing status: None; State listing status: Species of Special Concern. This small plover inhabits sandy marine and estuarine shores, salt ponds, and shores of alkali or brackish inland lakes. In the San Joaquin Valley they occur in the remnants of the Tulare Lake Basin and rarely in the grassland-wetland complexes in Merced County in alkaline habitats. Western snowy Plovers are absent from the Cross Valley CSA due to absence of suitable habitat with the one exception of the Creighton Ranch, which is in the Lower Tule Irrigation District.

Mountain Plover (*Charadrius montanus*). Federal listing status: None; State listing status: Species of Special Concern. This member of the shorebird family is found in dry upland habitats. The Mountain Plover nests in high elevation grasslands primarily in Montana, Wyoming, Colorado, and northeastern New Mexico. During the winter, this plover uses open habitats such as sparse and/or short grasslands and recently plowed or sprouting agricultural fields in California's Central Valley, the Imperial Valley, southern Arizona, and Northern Mexico.

Mountain Plovers wintering or migrating through the San Joaquin Valley may occasionally forage in recently plowed fields in the Cross Valley CSA.

Long-billed Curlew (*Numenius americanus*); Federal listing status: None; State listing status: Species of Special Concern. Long-billed Curlews are a winter visitor to central California. They forage in marshes, grasslands, and agricultural areas. Concern for this species pertains primarily with their breeding habitat, which is in the northeastern portion of the state. Long-billed Curlews are rare in the grassland areas and plowed fields of the Cross Valley CSA in late summer through early spring.

California Gull (*Larus californicus*). Federal listing status: None; State listing status: Species of Special Concern. The California Gull nests in east of the Sierra Nevada in alkali and freshwater lakes. They are a common, except for the breeding season, in most of lowland and coastal California. Concern for this species pertains primarily with their breeding habitat. Within the Cross Valley CSA, California Gulls are

fairly common. Large numbers of California Gulls roost nightly on Millerton Lake during the winter. During the day, they disperse to their various feeding sites, such as dumps, wastewater treatment facilities, dairies, irrigation canals, and flooded fields.

Burrowing Owl (*Athene cunicularia*). Federal listing status: None; State listing status: Species of Special Concern. The Burrowing Owl is a small, terrestrial owl of open country. Burrowing Owls favor flat, open grassland or gentle slopes and sparse-shrubland ecosystems. These owls prefer annual and perennial grasslands, typically with sparse or nonexistent tree or shrub canopies. In California, Burrowing Owls are found in close association with California ground squirrels (*Spermophilus beecheyi*). Owls use the abandoned burrows of ground squirrels for shelter and nesting.

Burrowing Owls are known to be resident within the Cross Valley CSA. They are likely to inhabit pastures, fallow fields, and canal and railway right-of-ways where ground squirrels have been allowed to invade.

Long-eared Owl (*Asio otus*). Federal listing status: None; State listing status; Species of Special Concern. Long-eared Owls hunt in open areas but also require riparian areas or other thickets with small, densely canopied trees (Grinell and Miller 1944). They feed primarily on voles but also eat other small rodents and birds. Long-eared Owls nest nearby in the foothills of the Sierra Nevada and are found on the Central Valley floor occasionally in winter.

Short-eared Owl (*Asio flammeus*). Federal listing status: None; State listing status; Species of Special Concern. Short-eared Owls occur in open habitats such as grasslands, wet meadows, and marshes. They require tules or other tall grasses for nesting or daytime refuge. This species once bred in much of the San Joaquin Valley (Grinell and Miller 1944), however, they are now most likely to be encountered as a winter visitor. Short-eared Owls are likely to be rare in the Cross Valley CSA, and are most likely to occur near alfalfa field or fallowed areas.

Loggerhead Shrike (*Lanius ludovicianus*). Federal listing status: None; State listing status; Species of Special Concern. This predatory songbird inhabits much of lower 48 states of the United States of America. They prefer open habitats interspersed with shrubs, trees, poles, fences or other perches from which they can hunt. Some populations of the Loggerhead Shrike, primarily those in eastern North America, have declined significantly over the last 20 years. Other populations, including those in western North America, appear to be decreasing as well. Even with this trend, Loggerhead Shrikes are still considered a fairly common species in California. Though they are likely to be more common in less disturbed habitats, Loggerhead Shrikes are still found throughout the Cross Valley CSA.

California Horned Lark (*Eremophila alpestris actia*). Federal listing status: None; State listing status; Species of Special Concern. Horned larks occur over nearly all of North America in bare ground habitats with short grass, scattered bushes, or no vegetation. In winter, they often form large flocks that sometimes contain several

subspecies. Grinnell and Miller (1944) list 13 subspecies of Horned Lark in California. One of these subspecies, the California Horned Lark, is currently a Species of Special-Concern in California. This subspecies is a widespread breeder along the coast and in the Central Valley of California, and is the only subspecies that nests in the Cross Valley CSA. The California Horned Lark is likely to breed in fallow fields within the Cross Valley CSA and is certainly present during the winter.

San Joaquin Le Conte's Thrasher (*Toxostoma lecontei macmillanorum*). Federal listing status: None; State listing status; Species of Special Concern. This desert bird is approximately eleven inches long and has a long slightly curved bill, with which it probes loose desert soils for insects and arthropods. It once occurred on the west side of the San Joaquin Valley from the Panoche Mountains in the north to Maricopa in the south in saltbush habitats. Based on specimens taken near Wasco, they may have also occurred on the Valley floor in Kern County (USFWS 1998). It is not clear if they ever occurred within the Cross Valley CSA, but it is highly unlikely that they any longer do (USFWS 1998).

Yellow Warbler (*Dendroica petechia*); Federal listing status: None; State Listing Status: Species of Special Concern. Yellow Warblers prefer deciduous, riparian habitats consisting of alders, cottonwoods, willows and other trees and shrubs. Most Yellow Warblers migrate to Mexico and South America in the fall and return to California to breed in April. Some birds spend winter in southern California lowlands.

While the some riparian habitat within the Cross Valley CSA appears suitable for Yellow Warbler, their breeding here is unlikely as they have apparently been extirpated from the Sacramento and San Joaquin Valleys as breeders due to a combination of habitat destruction and Brown-headed Cowbird parasitism of their nests. Yellow Warblers are a common migrant throughout California in the spring and fall.

Yellow-breasted Chat (*Ictera virens*); Federal listing status: None; State Listing Status: Species of Special Concern. Similar to the Yellow Warbler, the Yellow-breasted Chats favor dense riparian thickets for nesting (Grinnell and Miller 1944). Loss of nesting habitat and Brown-headed Cowbird parasitism of their nests has caused a decline in Central Valley populations. It is unlikely that they would inhabit any of the remaining riparian habitats in the Cross Valley CSA.

Tricolored Blackbird (*Agelaius tricolor*). Federal listing status: None; State Listing Status: Species of Special Concern. Tricolored Blackbirds are found almost exclusively in the Central Valley and central and southern coastal areas of California. In 1992, surveys by the California Department of Fish and Game determined that the population of this species was much larger than previously believed. Thus, the concern for the species lessened considerably.

The Tricolored Blackbird is highly colonial in its nesting habits and forms dense breeding colonies of up to tens of thousands of pairs. This species typically nests primarily in tall, dense, stands of cattails or tules, but also nests in blackberry, wild rose bushes and tall

herbs. Nesting colonies are typically located near standing or flowing freshwater. Tricolored Blackbirds form large, often multi-species, flocks during the non-breeding period and range more widely than during the reproductive season. Tricolored Blackbirds are known to nest in areas and forage within and adjacent to the contract service areas.

Townsend's Big-eared Bat (*Plecotus townsendii*). Federal listing status: none; State listing status: Species of Special Concern. The geographic range for this species includes most of California. Little information is available on the current population of this species in the Central Valley. Known roost sites in California include limestone caves, lava tubes, mine tunnels, buildings and other structures (Williams 1986). It is unlikely that significant roost sites exist within the Cross Valley CSA.

Pallid Bat (*Antrozous pallidus*). Federal listing status: None; State listing status: Species of Special Concern. This medium-sized bat occurs throughout much of California. The pallid bat is usually found in open lowlands were it preys upon flightless insects. It prefers roosting in caves and mine tunnels but buildings and trees may also be used. Pallid bats are pale to light brown in color, and, at about 24 grams, the Pacific race is one of the state's largest bats. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in hollow trees. Colonies can range from a few individuals to over a hundred and are non-migratory (Barbour and Davis 1969). Some female/young colonies (typically the coastal subspecies) use their day roost for their nursery as well as hibernacula, while other colonies (typically those in the desert) migrate locally on a seasonal basis (Johnston 1997). Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. This bat prefers foraging on terrestrial arthropods in dry open grasslands near water and rocky outcroppings or old structures. They may also occur in oak woodlands and at the edge of redwood forests along the coast. Pallid bats are sensitive to human disturbances at roost sites. Maternity colonies of this species are now uncommon and sparse in the San Joaquin Valley. It is unlikely that significant roost sites exist within the Cross Valley CSA.

Tulare Grasshopper Mouse (Onochomys torridus tularensis). Federal listing status: none; State listing status: Species of Special Concern. This small, predatory mouse occurs in arid grassland and scrubland habitats in central California. It preys on small animals including insects, scorpions, and even other species of mice. Tulare grasshopper mice historically occurred from about western Merced County and eastern San Benito County east to Madera County and south to the Tehachipi Range (USFWS 1998). Currently their distribution is limited to the western margin of the Tulare basin, including western Kern County, the Carrizo Plain and the Cuyama Valley side of the Caliente Mountains in San Luis Obispo County, the Ciervo-Panoche region in Fresno and San Benito counties, and the Allensworth Natural Area in Tulare County (USFWS 1998). The Tulare grasshopper mouse is no longer expected to occur within the Cross Valley CSA.

Ringtail (*Bassiriscus astutus*). Federal Status: None; State Status: Fully Protected Species. The ringtail is a fully protected species in the state of California and is protected from taking by state regulations. Though ringtails have been recently recorded on the valley floor in the Sacramento Valley, they are not considered to range out into the valley floor in the San Joaquin Valley (Jameson and Peeters 1988). Ringtails prefer wooded canyon bottoms along watercourses and are not expected to occur within the Cross Valley CSA.

HABITAT STATUS

Plant communities described by Mayer and Laudenslayer (1988) and used in the California Wildlife Habitat Relationship System (WHR) that occur within the Cross Valley CSA include: riverine, lacustrine, annual grassland, alkali deserts and scrubs, valley and foothill riparian, blue oak woodland, valley oak woodland, and fresh emergent wetland. These communities can be further divided into specific habitats and habitat elements according to the California Department of Fish and Game (CDFG) *Description of Terrestrial Natural Communities of California* (Holland 1986). Within these habitats, many specific habitat elements are regarded as sensitive by the CDFG (Table 7; listed in italics) and some are documented in the CDFG Rarefind Database (CNDDB 2000). CNDDB "community" is not defined here but is shown in Table 7. A total of 23 habitat elements occur within the Cross Valley CSA in addition to riverine and lacustrine habitats, of which 9 are documented in the Rarefind Database (Table 7; listed in bold italics). Table 7 lists both sensitive and common habitats found below an elevation of 1000 feet within the Cross Valley CSA.

Table 7. Natural Communities and Associated Sensitive Habitats Occurring within the Cross Valley Contract Service Area. CNDDB sensitive habitats documented within Cross Valley CSA are Listed in Bold Italics.

WHR Type	CNDDB Habitat	CNDDB Element	CNDDB Community
Riverine and Lacustrine	N/A	N/A	N/A
Annual Grassland	Valley and Foothill Grasslands	*Valley needlegrass grassland*	Herbaceous Communities
		Valley sacaton grassland	
		Valley wildrye grassland	
		Non-native grassland	
		Wildflower field	
	Vernal Pools	***Northern hardpan vernal pool***	
		Northern claypan vernal pool	
		Northern basalt flow vernal pool	
Alkali deserts and scrubs	Meadows	Alkali meadow	
		Alkali seep	
	Chenopod Scrub	***Valley Sink Scrub***	Scrubs and Chaparrals
		Valley Saltbush Scrub	
Valley Foothill Riparian	Riparian Forest	*Great valley cottonwood riparian forest*	Riparian Communities
		Great valley mixed riparian forest	
		Great valley valley oak riparian forest	
		White alder riparian forest	
	Riparian Scrub	Great valley willow scrub	
	Riparian Woodland	***Sycamore alluvial woodland***	
Blue oak woodland	Cismontane woodlands	Blue oak woodland	Woodland Communties
Valley oak woodland		*Valley oak woodland*	
Fresh emergent wetland	Marsh	Cismontane (valley) alkali marsh	Wetlands
		Coastal and valley freshwater marsh	
		Vernal Marsh	

EXISTING ENVIRONMENT

The Cross Valley CSA includes eight contractors (and eleven subcontractors) in portions of Fresno, Kings, Kern, and Tulare counties. These contractors represent two counties, three water districts, and three irrigation districts (Table 5). Only those vegetation communities and habitats commonly occurring at or below 1000 feet elevation were included in this BA, though the range of some of these habitats extends up to 3000 feet in elevation. The existing vegetative environment within the Cross Valley CSA is described below. The discussion is arranged by the habitat types described by Mayer and Laudenslayer (1988) and used in the WHR System. The specific elements of these communities as described by Holland (1986) are summarized in Table 7. A discussion of anthropogenic communities and agricultural areas is also provided. While special-status species occur in most habitats within the Cross Valley CSA, their habitat requirements are presented in the Species Accounts section of this document.

Riverine and Lacustrine Communities

Freshwater aquatic communities include both riverine and lacustrine environments (Table 7). Millerton Lake and the San Joaquin River represent these environments within the Cross Valley CSA. Areas that are seasonally wet may also support freshwater aquatic environments; these include vernal pools and marshes that are described below within the context of annual grassland and fresh emergent wetland communities, respectively. Aquatic communities are dependent on several interacting environmental factors, including species composition, water depths, water level fluctuations, water flow rates, water and air temperatures, pH, dissolved salts, organic content of the water, nature and depth of bottom sediments, and history of the water body. Deep, open water areas may support submerged and/or floating vegetation while shallow water areas generally support emergent vegetation. Both riverine and lacustrine environments may support both types of vegetation. Water levels in artificial reservoirs (i.e., livestock or farm ponds, irrigation storage ponds) often fluctuate, however, which prevents well-developed aquatic communities from becoming established. Likewise, high water flows in rivers and streams may cause the seasonal scouring of vegetation.

Lacustrine habitats are those that occur in open water and may include algal, submergent, and floating vegetation as mentioned. The algal component is primarily plankton with a variety of algal species. Vascular plants include hornwort *(Ceratophyllum demersum)*, elodea *(Elodea canadensis)*, quillwort *(Isoetes* spp.), water-milfoil *(Myriophyllum* spp.), water-nymphs *(Najas* spp.), and pondweeds *(Potamogeton* spp.). Floating plants include water fern *(Azolla filoculoides)*, duckweed *(Lemna* spp.) water buttercup *(Ranunculus aquatilis)*, and bladderwort *(Utricularia* spp.).

Riverine habitats may also include algal and floating vegetation, as well as emergent vegetation where the flow of water and water depths permit. Typical emergent and floating vegetation seen in rivers and streams includes bulrushes (*Scirpus* spp.), cattails (*Typha* spp.), watercress (*Rorippa nasturtium-aquaticum*), water primrose (*Ludwigia*

spp.), knotweed (*Polygonum* spp.), and willow saplings (*Salix* spp.). Some of these species are also commonly found in wetland and/or marsh habitats.

Open ponds provide feeding and loafing areas for a variety of birds including the Eared Grebe (*Podiceps nigricollis*), Western Grebe (*Aechmophorus occidentalis*), Clark's Grebe (*A. clarkii*), American White Pelican (*Pelecanus erythrorhynchos*), Double-crested Cormorant (*Phalacrocorax auritus*), and American Coot (*Fulica americana*). Waterfowl using open ponds include the Canvasback (*Aythya valisineria*), Lesser Scaup (*Aythya affinis*), Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Northern Shoveler (*Anas clypeata*), and Canada Goose (*Branta canadensis*). Depending on their location, size, and structure, reservoirs may support a variety of the life history requirements of many terrestrial species found with the Cross Valley Contractors.

Annual Grassland Communities

Annual grassland communities within the Cross Valley CSA are divided into valley and foothill grassland, and vernal pool habitats as defined by the CNDDB (Table 7). The valley and foothill grassland habitats are further divided into five elements including valley needlegrass, valley sacaton, valley wildrye grasslands, non-native grasslands, and wildflower fields. Of these, the needlegrass and sacaton grasslands, and wildflower fields are sensitive habitats according to the CNDDB. The vernal pool habitats are further divided into three elements including northern hardpan, northern claypan, and northern basalt flow vernal pools; all three elements are sensitive according to the CNDDB.

Valley needlegrass grassland typically occurs on fine-textured soils in openings in oak savanna. Once dominated by perennial bunch grasses such as purple needlegrass (*Nassella pulchra*) and slender needle grass (*Nasella lepida*), most remnants are dominated by introduced annual species.

Valley sacaton grasslands occur on poorly drained, alkaline soils. Dominant species include the perennial bunch grass alkali sacaton (*Sporobolus airoides*) and salt grass *(Distichlis spicata*).

Valley wildrye grassland occurs on moist sites at low elevations often in openings in riparian forest habitats. Soils are typically subalkaline and experience seasonal flooding. The sod-forming perennial grass leymus (*Elymus triticoides*) is the dominant species within this type.

Excluding agricultural fields, non-native grassland is the most widespread herbaceous habitat element in the Cross Valley CSA and its components can be found in most of the other herbaceous habitats. This habitat is dominated by non-native, annual grass species such as wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red foxtail chess *(Bromus madritensis* spp. *rubens*), foxtail *(Hordeum murinum*), Italian ryegrass *(Lolium multiflorum*), and annual fescues *(Vulpia* spp.). The

most common non-native forbs include mustards *(Brassica* spp.*)* and filarees *(Erodium* spp.).

Wildflower fields are dominated by non-native annual grass species and are characterized by brilliant displays of spring-blooming forbs such as California poppy (*Eschscholzia californica*), lupine (*Lupinus* sp.), trefoil (*Lotus* spp.), popcornflower (*Plagiobothrys* spp.), and layia (*Layia sp.*). Other common native forbs include fiddleneck (*Amsinckia* spp.), gilia (*Gilia* spp.), California goldfields (*Lasthenia californica*), linanthus (*Linanthus* spp.), owl's clover (*Orthocarpus* spp.), and phacelia (*Phacelia* spp.). These are all spring flowering plants and most are annuals. Common summer and fall flowering plants include tarweeds (*Lagophylla* spp.), turkey mullein (*Eremocarpus setigerus*), vinegar weed (*Trichostema lanceolatum*), and buckwheat (*Eriogonum* spp.). Annual native grass species include wild barley (*Hordeum depressum*).

Vernal Pools are shallow, ephemeral water bodies that typically occupy depressions in grasslands, but occasionally occur in woodland areas. An impervious layer of hardpan, claypan, or bedrock underlies the pools and results in the collection and ponding of water during winter and spring rains. The depth of these pools ranges between a few centimeters to about one foot depending on the topography. The pools gradually dry which produces a series of concentric rings of herbaceous vegetation around the pool margins.

Species composition in vernal pools varies in accordance with chemical and physical properties such as salinity, alkalinity (pH), depth, and duration of the pool. Most species that occur within vernal pools are endemic to California and require seasonal inundation followed by desiccation to complete their life cycles. Relative to other community types, vernal pools still support a high percentage of native vegetation. Herbaceous plants that begin as aquatic plants and make a transition to a dry land environment as the pools dessicate characterize vernal pools. Most vernal pool vegetation is comprised of annual herbs with some deeply rooted perennials. Vernal pool plant species typically include: foxtail, water starwort *(Callitriche* spp.), hairgrass *(Deschampsia danthonioides*), downingia *(Downingia* spp.), rush *(Juncus* spp.), flowering quillwort *(Lilaea scilloides*), meadowfoam *(Limnanthes douglasii*), tricolor monkeyflower *(Mimulus tricolor*), orcutt grass *(Orcuttia* spp.), popcornflower, woolly marbles *(Psilocarphus* spp.), quillwort (*Isoetes* spp.), water-clover fern (*Marsilea* spp.), white brodiaea *(Brodiaea hyacinthina*), slender spikerush *(Eleocharis acicularis*), and coyote thistle *(Eryngium* spp.).

Northern claypan vernal pools occur on the lower terraces and basin rims of the San Joaquin Valley (Holland 1986). They are more or less saline and are perched by silica-cemented hardpan. The primary difference between the various sensitive vernal pool elements is elevation and substrate.

Northern hardpan vernal pools occur on higher alluvial terraces along the eastside of the great valley in large areas of hogwallow relief. Water in these pools is perched upon very acidic iron and silica-cemented hardpans.

Northern basalt flow vernal pools are scattered along the western foothills of the Sierra Nevada. These pools occur in small depressions on the tops of massive basalt flows covered with thin soils perched on bedrock.

Valley and foothill grasslands provide cover and foraging areas for species such as the black-tailed hare (*Lepus californicus*), California ground squirrel, California vole (*Microtus californicus*), and the Coyote (*Canis latrans*). These areas also provide nesting areas for the, Burrowing Owl (*Athene cunicularia*), Horned Lark, Western Kingbird (*Tyrannus verticalis*), and Western Meadowlark (*Sturnella neglecta*). This habitat provides important foraging areas for the Turkey Vulture (*Cathartes aura*), Northern Harrier, American Kestrel (*Falco sparverius*), White-tail Kite, Prairie Falcon, and Barn Owl (*Tyto alba*). Reptilian species include the western fence lizard (*Sceloperus occidentalis*), site-blotched lizard (*Uta stansburiana*), gopher snake (*Pituophis melanoleucus*), and the western rattlesnake (*Crotalus viridis*).

Animal species that are vernal pool dependent include special-status species such as the fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), California tiger salamander, and western spadefoot. A common invertebrate species is the California linderiella (*Linderiella occidentalis*). Migrating birds such the Mallard, Cinnamon Teal, Black-necked Stilt (*Himantopus mexicanus*), and Greater Yellowlegs (*Tringa melanoleuca*) will feed and loaf in vernal pools during spring migrations.

Alkali Deserts and Scrubs

Alkali desert and scrub communities within the Cross Valley CSA are divided into chenopod scrub and meadow habitats as defined by the CNDDB (Table 7). The chenopod scrub habitat is further divided into valley sink scrub and valley saltbush scrub; the former habitat is sensitive according to the CNDDB (2000). The meadow habitat is further divided into alkali meadow and alkali seep. The alkali seep community is designated as sensitive (CNDDB 2000).

The chenopod scrub habitats within the Cross Valley CSA typically occur on valley floors characterized by interior drainage whereby watercourses drain into a basin subject to evaporation. Subsequent evaporation in these "valley sinks" has created highly saline and/or alkaline environments that support halophytic plant species. These species include iodine bush (*Allenrolfea occidentalis*), pickleweed (*Salicornia subterminalis*), Kochia (*Kochia californica*), seepweeds (*Sueda* spp.), and many species of saltbush (*Atriplex* spp.).

Valley sink scrub is characterized by low, open to dense succulent shrubland typically dominated by iodine bush and seepweed with little to no herbaceous understory, except in the spring (Holland 1986). This habitat occurs on lakebeds and playas where white salty crusts form over dark, sticky clays, and capillary ground water feeds the perennials. Valley sink scrub formerly surrounded Kern, Tulare, and other lakes but is now mostly extirpated due to flood control, agriculture, and ground water pumping.

Meadow habitats occur on the Valley Springs Formation of the eastern central valley and in salt affected grasslands of the Cross Valley CSA (Holland 1986). These are herbaceous communities developed on fine-textured, more or less permanently moist, alkaline soils. They typically consist of fairly open, to dense growth of perennial grasses such as sacaton (*Sporobolus airoides*) and sedges (*Carex* spp.), and other alkali tolerant species such as iodine bush and hispid bird's beak (*Cordylanthus mollis* ssp. *hispidus*). Alkaline meadows may also intergrade with other alkaline and non-alkaline habitats with varying degrees of saturation that occupy valley bottoms such as non-native grassland, and northern claypan vernal pools.

Alkali seeps are associated with alkaline meadows in that they either feed these meadows or occur at a low elevation with alkaline conditions that support some of the same species as alkaline meadows. Examples of such species include pondweed (*Potamogeton* spp.) and nitrophila (*Nitrophila occidentalis*).

Many of the wildlife species associated with alkali desert scrub have suffered substantial population declines as this habitat has been converted to croplands, orchards and vineyards. Rodent and predator control programs may have had adverse effects on small mammal populations. Several terrestrial vertebrates using alkali scrub and alkali grassland habitats are now afforded some measure of protection by Endangered species laws. Among these are western spadefoot, blunt-nosed leopard lizard, San Joaquin whipsnake, Burrowing Owl, San Joaquin kit fox, and Fresno and Tulare kangaroo rats.

Valley Foothill Riparian Communities

Valley foothill riparian communities occur along the Chowchilla, Fresno, and San Joaquin rivers, and numerous creeks and sloughs within the Cross Valley CSA. This community includes both riparian forest and riparian scrub habitats as defined by the CNDDB (2000) (Table 7). The riparian forest habitat is further divided into four elements including great valley cottonwood, great valley mixed, great valley oak riparian forests, and white alder riparian forest. The former three elements are sensitive (CNDDB 2000). The riparian scrub habitat includes great valley willow scrub.

Riparian communities usually consist of one or more deciduous tree species plus an assortment of shrubs and herbs that border streams, rivers, lakes, and springs. These forests vary from dense stands to well dispersed individual trees. The extent of riparian vegetation also varies depending on the size and nature of the bank, topography of the floodplain, the amount of water carried by the watercourse, and the depth of the aquifer. The composition of the understory varies depending on the seasonal fluctuation in available light. During the winter, leafless deciduous trees allow direct sunlight to reach understory vegetation. During the summer, shade from broadleaf trees decreases the amount of sunlight reaching the understory and contributes to cooler temperatures and higher humidities within the riparian corridor.

Riparian communities occur from the floor of the Central Valley to the lower elevation margins of the montane coniferous forest of cismontane California. These riparian zones

can vary from broad valley floodplain forests to narrow, steep canyon streams. Deciduous trees common to riparian forests include: white alder (*Alnus rhombifolia*), Oregon ash (*Fraxinus latifolia*), western sycamore (*Platanus racemosa*), Fremont's cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), red willow (*Salix laevigata*), Gooding's (or black) willow (*Salix gooddingii*), and arroyo willow (*Salix lasiolepis*). Common evergreen species include interior live oak (*Quercus wislizenii*), California bay-laurel (*Umbellularia californica*), and a noxious exotic weed, salt cedar (*Tamarix* spp.). Shrubs common to both riparian forests and scrubs include: seep willow (*Baccharis salicifolia*), button-willow (*Cephalanthus occidentalis*), dogwoods (*Cornus* spp.), California wild rose (*Rosa californica*), blackberries (*Rubus* spp.), elderberries (*Sambucus* spp.), California grape (*Vitis californica*), and poison oak (*Toxicodendron diversilobum*). Herbaceous species include: spikenard (*Aralia californica*), mugwort (*Artemisia douglasiana*), sedges (*Carex* spp.), flat-sedges (*Cyperus* spp.), spike-rushes (*Eleocharis* spp.), willow-herbs (*Epilobium* spp.), horsetails (*Equisetum* spp.), rushes (*Juncus* spp.), monkeyflowers (*Mimulus* spp.), watercress (*Nasturtium officinale*), bulrushes (*Scirpus* spp.), stinging nettle (*Urtica holosericea*), and cattail (*Typha* spp.).

Great valley cottonwood riparian forests occur in alluvial soils near streams that provide a year-round subsurface water table. Because of this condition, springs are common within these areas. Characteristic species include Fremont's cottonwood, assorted willows, box elder (*Acer negundo*), and Oregon ash.

Great valley mixed riparian forests are more distant from river and stream banks than great valley cottonwood riparian forests. Flooding and scouring events are less frequent and not as severe. Dominant species are typically winter deciduous and include California walnut (*Juglans hindsii*), white alder, western sycamore, Fremont's cottonwood, box elder, and assorted willow species.

Great valley oak riparian forests are also more distal from river and stream banks, where less physical disturbance occurs during floods. Dominant species include valley oak, California walnut, white alder, western sycamore, Oregon ash, blackberries, and poison oak.

White alder riparian forests occur along rapidly flowing, well aerated, perennial, canyon streams that experience substantial scouring and high flows during spring runoff. Such canyons are often deeply incised, resulting in a narrow riparian corridor.

Great valley willow scrub occurs on floodplains that are frequently inundated and on banks of major rivers and smaller streams. Dense stands of willows dominate this community. Species of willow that commonly occur include the narrow-leaved willow (*Salix exigua*), arroyo willow, red willow, and dusky willow (*Salix melanopsis*). California wild rose and Fremont's cottonwood are often associated with this community.

The value of riparian habitats to wildlife depends on their structural diversity. Willow scrub communities do not support as diverse wildlife communities as mixed riparian forests or riparian habitats with valley oaks. The discussion of riparian wildlife below

pertains to great valley mixed riparian and great valley oak riparian forests habitats as are found along portions of the San Joaquin River. Several of the riparian habitats within the Cross Valley CSA are less extensive and diverse.

The leaf litter and fallen branches in riparian habitats provide cover for amphibians such as western toad and pacific treefrog (*Hyla regilla*). Several lizards can also be found here including western fence lizard, Gilbert's skink, and southern alligator lizard (*Gerrhonotus multicarinatus*). Snakes that may be found here include the racer (*Coluber constrictor*), common kingsnake (*Lampropeltis getulus*), and common garter snake (*Thamnophis sirtalis*).

Riparian habitats within the Cross Valley CSA provide for the greatest diversity of birds. Both Red-shouldered Hawks (*Buteo lineatus*) and Great Horned Owls hunt and roost here. Woodpeckers, such as Nuttall's Woodpecker (*Picoides nutallii*) and Northern Flicker (*Colaptes auratus*) excavate nest holes in trees. Nest holes abandoned by woodpeckers are important because they become homes to other birds such as Western Bluebird (*Silia mexicana*), White-breasted Nuthatch (*Sitta carolinensis*), Ash Throated Flycatcher (*Myiarchus cinerascens*), and Western Screech Owl (*Otus kennicottii*). Other birds found in this habitat will include Western Scrub-Jay (*Aphelocoma californica*), Northern Oriole (*Icterus galbula*), and Bewick's Wren (*Thryomanes bewckii*).

Small mammals occurring in riparian habitats may include the ornate shrew (*Sorex ornatus*), California vole, and Audubon's cottontail (*Sylvilagus audubonii*). Predators such as gray fox (*Urocyon cinereoargenteus*), coyote, bobcat (*Lynx rufus*), and long-tailed weasel (*Mustela frenata*) are likely to be attracted to the wooded riparian habitats due to the abundance of prey.

Woodland Communities

Woodland communities within the Cross Valley CSA occur at elevations ranging from 30 to 5,000 feet in the San Joaquin Valley and foothills of the Sierra Nevada. The types of woodland communities within the Cross Valley CSA include valley oak woodland, and blue oak woodland. These communities are regarded as cismontane woodlands by the CNDDB (2000), and identifies them as elements with the same names; two additional cismontane woodland elements known as open digger pine woodland, and Digger-pine oak woodland were not considered here because they generally occur at elevations above the Cross Valley CSA. Only valley oak woodland is regarded as sensitive by the CNDDB (2000).

Dominant species and community structure in woodlands are influenced by elevation, soils, and aspect. Trees that are 15 to 70 feet in height that form open savannas to dense closed-canopy woodlands dominate woodland communities. Woodland habitats are often more dense on the north-facing slopes in the southern Sierra Nevada. The density and diversity of woodlands increases with elevation, where they also begin to intergrade with broadleaf and coniferous forests. Most woodland communities consist of scattered trees and shrubs with an understory of grasses and forbs. Trees common to woodlands include

blue oak (*Quercus douglasii*) and foothill (formerly digger) pine (*Pinus sabiniana*). The understories are comprised of grasses, forbs, and shrubs. California buckeye (*Aesculus californicus*), redbud *(Cercis occidentalis*), ceanothus (*Ceanothus* spp.), buckthorn (*Rhamnus* spp.), shrub oaks (*Quercus* spp.) and poison oak are examples of shrubs existing within the understory.

Valley oak woodlands are generally restricted to deep alluvial soils at low elevations that parallel riparian communities. Other oak species tend to occur on shallower soils on slopes. Valley oak stand densities range from open savanna to dense forest savanna and are often comprised exclusively of valley oak (*Quercus lobata*). The understory is typically composed of non-native grasses and forbs as described above. Most of the valley oaks in the San Joaquin Valley have been removed through the processes of crop cultivation and urbanization. A few scattered stands remain in the valley in areas around dwellings and in parks. Very little regeneration has occurred, primarily due to livestock grazing.

Oak woodlands provide important food and cover for many species of wildlife. Oak trees provide food resources, shelter, and nesting and denning habitat important to a variety of avian and mammalian species. Avian species expected in a valley oak community include the Red-tailed Hawk, California Quail (*Callipepla californica*), Oak Titmouse (*Baeolophus inornatus*), Western Scrub-jay, Spotted Towhee *(Pipilo maculatus*), Bewick's Wren, Bushtit *(Psaltriparus minimus*), and Acorn Woodpecker (*Melanerpes formicivorous*). Mammalian species include the mule deer (*Odocoileus hemionus*), western gray squirrel *(Sciurus griseus*), bobcat, coyote, western harvest mouse *(Reithrodontomys megalotis*), Botta's pocket gopher (*Thomomys bottae*), California vole, and deer mouse (*Peromyscus manculatus*). Reptilian species include the western fence lizard, gopher snake, and western rattlesnake.

Fresh Emergent Wetland Communities

Fresh emergent wetland communities occur along margins of ponds and lakes, and in the floodplains of slow moving streams and rivers within the Cross Valley CSA. This community is regarded as marsh habitat that is further divided into cismontane (valley) alkali marsh, coastal and valley freshwater marsh, and vernal marsh (CNDDB 2000) (Table 7). The coast and valley freshwater mash has been designated as a sensitive community (CNDDB 2000).

Marshes develop where shallow depths and slow-moving or stagnant water persists. They can also develop where seepage from springs or shallow water tables allow rooted aquatic plants to become established. Common marsh plants include sedges *(Carex* spp.), spikerushes (*Eleocharis* spp.), bulrushes, bur reeds *(Sparganium* spp.), cattail, tule *(Scirpus acutus*), water hemlock *(Cicuta maculata*), willow-herbs *(Epilobium* spp.), common monkeyflower (*Mimulus guttatus*), watercress, knotweeds, dock *(Rumex* spp.), pondweed, duckweed, and ditch-grass *(Ruppia* spp.).

Coastal and valley freshwater marsh is dominated by perennial, emergent monocots up to 16 feet tall that often form closed canopies (Holland 1986). Deep peaty soils accumulate in these marshes where saturation is prolonged. Typical species include bulrush (*Scirpus californicus*), common reed (*Phragmites australis*), cattails (*Typha* spp.), and bur-reed (*Sparganium eurycarpum*). This marsh is common in the Sacramento and San Joaquin valleys in river oxbows and other floodplain areas, but is otherwise much reduced throughout its entire range.

Freshwater marshes are among the most productive wildlife habitats in California, providing a diversity of habitats for a wide variety of wildlife species. This habitat provides foraging, loafing, and cover for species such as the Mallard, Northern Pintail, Gadwall *(Anas strepera)*, Green-winged Teal *(Anas crecca)*, Cinnamon Teal *(Anas cyanoptera)*, Canada Goose, White-fronted Goose *(Anser albifrons)*, American Coot, American Bittern *(Botaurus lentiginosus)*, Green Heron *(Butorides striatus)*, Great Egret, Snowy Egret, Great Blue Heron, Northern Harrier, Red-tailed hawk, Dowitcher (*Limnodromus* sp.), Least Sandpiper *(Calidris minutilla)*, Western Sandpiper *(Calidris mauri)*, Black-bellied Plover *(Pluvialis squatarola)*, Killdeer *(Charadrius vociferus)*, Dunlin *(Calidris alpina)*, American Avocet *(Recurvirostra americana)*, and Black-necked Stilt *(Himantopus mexicanus)*. Mammals include the California vole, muskrat *(Ondatra zibethicus)*, raccoon *(Procyon lotor)*, coyote, striped skunk, and long-tailed weasel. Amphibians and reptiles that depend on or utilize freshwater marshes include the western toad, pacific treefrog, western pond turtle, and common garter snake snake.

Anthropogenic Communities and Agricultural Areas

Much of vegetation within the San Joaquin Valley has been altered by human activities that include urbanization, roads and highways, livestock grazing, and agriculture. Communities dominated by introduced plants and established or maintained by human disturbance are referred to as anthropogenic communities. Anthropogenic communities include: (1) agrestal communities, (2) pastoral communities, (3) ruderal communities, (4) plantations, and (5) the urban mix.

Agrestal communities occur in areas that have been disturbed by cultivation and thrive in the same environment as agricultural crops. Pastoral communities are dominated by species that are adapted to livestock grazing. Valley grassland communities have become a type of pastoral community. Ruderal communities are highly disturbed areas such as roadsides and similar disturbed sites in towns and cities. Plantations are areas that have been planted with trees such as windbreaks and orchards. Urban mix habitats are areas where non-native plant species have escaped, or been planted in and around urban or residential developments. It is common to find a mix of native and non-native plants in urban open areas. The local urban mix is difficult to classify due to the variety and vast number of cultivated species introduced into the urban setting.

Anthropogenic communities provide some habitat for native animal species, as well as to non-native species such as the House Sparrow *(Passer domesticus)*, European Starling *(Sturnus vulgaris)*, Rock Dove *(Columba livia)*, black rat *(Rattus rattus)*, and house

mouse *(Mus musculus)*. Wintering waterfowl and coots are expected to forage in parks and golf courses. Trees and shrubs provide nesting, roosting, and foraging areas for native species such as the Northern Mockingbird *(Mimus polyglottos)*, Mourning Dove, Brewer's Blackbird *(Euphagus cyanocephalus)*, American Crow *(Corvus brachyrhynchos)*, and Western Scrub-jay, as well as for hummingbirds and songbirds. Mammals that would be expected in an urban setting include the Virginia opossum (*Didelphis marsupialis*), striped skunk, Botta's pocket gopher, ground and tree squirrels, and bats.

Agricultural areas provide cover, foraging, and loafing areas for a variety of wildlife. Pre-irrigated grain fields provide food and loafing areas for migrating and wintering waterfowl, shorebirds, gulls, and terns. Standing grain and alfalfa fields provide feeding and nesting cover for ducks such as the Mallard. Grain and alfalfa fields support rodent populations that serve as prey for avian and mammalian predators. Irrigated alfalfa fields provide foraging areas for gulls and egrets. Open, fallow fields provide areas for wintering species such as the Horned Lark. Some types of orchards provide nesting and roosting areas for passerine and small mammal species.

EFFECTS

The purpose of Long-Term Contract Renewal Project is to renew the Cross Valley Contractors water service contracts, consistent with the provisions of CVPIA Section 3403(c). With the LTCR, water would continue to be delivered to contractors within the Cross Valley CSA to support agriculture and M&I uses. Direct effects include those actions that are the direct result of the proposed action and include interrelated actions and interdependent actions. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur.

Listed species occur throughout the Cross Valley CSA on native habitats, agricultural lands, and marginal habitats surrounding agricultural lands and reservoirs, conveyance facilities, pumping plants, and urban centers. Activities facilitated by the availability and use of water supplied as a result of the Long-term Contract Renewal can thus directly and indirectly affect listed species or their habitat.

The pumping, delivery, and application of CVP water can adversely affect various aspects of the biology of listed species, including reproduction, growth, survival, migration, predator avoidance, and foraging. Activities such as water impoundments and diversions, agricultural land conversions and related operations, municipal and industrial development, and operations and maintenance will continue to directly and indirectly affect listed species and their habitat (USFWS 2000c).

Water Impoundments and Diversions

Water impoundments and diversions have ultimately led to the listing of many species and the renewal of long-term contracts facilitating these actions can reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. This reduction, however, should not occur given that: the CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and later hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed (USFWS 2000c, Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999); Reclamation and CVP contractors are in compliance with all opinions related to the CVP (Appendix F); conservation actions described in the Project Description of the draft biological opinion (USFWS 2000c) are fully implemented, including Agency Commitments for New and Continuing Project Actions (USFWS 2000c), specific guidance for Water Service Contracts and Conservation Measures (USFWS 2000c); discharges into surface water bodies by CVP water contractors resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of listed species are stable or

increasing; and the Bureau and the service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

Agricultural Land Conversions and related operations

Agricultural conversions and related operations either directly or indirectly facilitated by the renewal of long-term contracts include: conversion of native habitats to agricultural fields; conversion of land use to more water intensive purposes; disposal of agricultural drainwater; application of pesticides; and other mowing and harvesting operations (USFWS 2000c). Agricultural conversions have ultimately led to the listing of many species and can reasonably be expected to reduce the likelihood of survival and recovery of these species.

The renewal of long-term contracts should not reduce the likelihood of the survival and recovery of listed species given the assumptions that: any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect; implementation of recovery plans will be an integral part of site-specific consultation; Interior will work closely with the water users, providing them maps of listed species habitats within their service areas and guiding them through the consultation process to address site-specific effects; conservation strategies will be in place for districts or areas receiving CVP water; CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and later hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed (USFWS 2000c, Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999); Reclamation and CVP contractors are in compliance with all opinions related to the CVP (Appendix F); Interior will ensure full implementation of the conservation actions described in the Project Description of the draft biological opinion (USFWS 2000c) are fully implemented, including Agency Commitments for New and Continuing Project Actions (USFWS 2000c), specific guidance for Water Service Contracts and Conservation Measures (USFWS 2000c); discharges into surface water bodies by CVP water contractors resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of listed species are stable or increasing; and the Bureau and the Service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

Municipal and industrial development

Municipal and industrial development facilitated by the renewal of LTCR includes the conversion of native habitat to municipal and industrial uses; conversion of agricultural land for municipal and industrial uses; construction of infrastructure and supportive networks pesticide and herbicide application; and recreational uses (USFWS 2000c). Municipal and industrial development, which is an indirect effect of water impoundments and diversions, can reasonably be expected to reduce the likelihood of survival and recovery of listed species, because once the development has occurred, the opportunity of utilizing the land to contribute to survival and recovery is foreclosed. However, large increases in additional facilities to support agriculture in the San Joaquin Valley are not anticipated since the infrastructure already in place is very extensive. Moreover, reduction in the likelihood of survival and recovery of these species should not be the case based on the assumptions that: any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect; implementation of and conformance with recovery plans will be an integral part of site-specific consultation; Interior will work closely with the water users, providing them maps of listed species habitats within their service areas and guiding them through the consultation process to address site-specific effects; conservation strategies will be in place for districts or areas receiving CVP water; CVP will be managed in a manner consistent with the CVPIA Section 3406(b)(2) decision of October 1999; flow standards that form the environmental baseline of the 1995 OCAP biological opinion are met; Reclamation will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and later hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed (USFWS 2000c, Appendix K, letter to the Service and NMFS from Reclamation, dated October 29, 1999); Reclamation and CVP contractors are in compliance with all opinions related to the CVP (Appendix F); Interior will ensure full implementation of the conservation actions described in the Project Description of the draft biological opinion (USFWS 2000c) are fully implemented, including Agency Commitments for New and Continuing Project Actions (USFWS 2000c), specific guidance for Water Service Contracts and Conservation Measures (USFWS 2000c); discharges into surface water bodies by CVP water contractors resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); Reclamation will consult on all changes in purpose of use for CVP water contracts from Agriculture to Agriculture/Municipal and Industrial; monitoring is implemented which shows that the baselines of listed species are stable or increasing; and the Bureau and the service will coordinate when the quantity of water to be delivered to the districts exceeds the average historical delivery amounts and in the view of the Service may affect listed or proposed species.

Operations and Maintenance

Operations and maintenance activities necessary for the continued delivery of water under LTCR include mowing, levee maintenance, dredging, pest control, erosion control,

and flood control. These activities can reasonably be expected to reduce the likelihood of survival and recovery of listed species (USFWS 2000c), but should given the assumptions that: O&M plans are developed and implemented by all Reclamation area offices as described in the draft biological opinion (USFWS 2000c) and are consistent with section 7(a)(1) of the ESA; Interior will ensure full implementation of other conservation actions described in the Project Description of the draft biological opinion (USFWS 2000c), including Agency Commitments for New and Continuing Project Actions, specific guidance for Water Service contracts and Conservation Measures; any site-specific effects to listed species will be addressed through site-specific analysis and implementation of avoidance measures in compliance with existing biological opinions (USFWS 2000c); implementation of and conformance with recovery plans will be an integral part of management actions; Reclamation will consult on development and implementation of Resource Management Plans; Reclamation and CVP contractors comply with all opinions related to the CVP (Appendix F); discharges into surface water bodies resulting from CVP water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (Service File # 1-1-98-F-21); monitoring is implemented which shows that the baselines of listed species are stable or increasing.

More details on these programs can be found within the *Draft Biological Opinion on the operation and maintenance of the Central Valley Project and implementation of the Central Valley Project Improvement Act* (USFWS 2000c). This BA is in concurrence with their finding that full implementation of these programs and consultation to minimize any secondary adverse effects is crucial to maintaining or increasing the likelihood of survival and recovery of listed species within the Cross Valley CSA. This said, it should be understood that the boundaries of the Cross Valley CSA will not change as a result of LTCR, and no major changes in water allocation or distribution are expected to occur as a result of the LTCR process. LTCR will not result in the expansion of districts within the Cross Valley CSA. These factors, along with the conservation provisions that are scheduled for implementation as an integral part of LTCR will help to ensure that the continued existence of special status species occurring within, and affected by, the Cross Valley CSA, will not be jeopardized. A discussion of the effects of long-term contract renewal on special-status species within the CSA is provided below.

EFFECTS ON SPECIAL-STATUS PLANT SPECIES

Bakersfield smallscale (*Atriplex tularensis*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Bakersfield smallscale or its habitat.

Kaweah brodiaea (*Brodiaea insignis*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Kaweah brodiaea or its habitat.

Succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*). The LTCR will not result in the expansion of Cross Valley districts that might impact succulent owl's-clover or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. The standard avoidance measures applied for vernal pool crustaceans may also protect sensitive vernal pool flora such as Succulent owl's-clover. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

California jewel-flower (*Caulanthus californicus*). The LTCR will not result in the expansion of Cross Valley districts that might impact California jewelflower or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Hoover's spurge (*Chamaesyce hooveri*). The LTCR will not result in the expansion of Cross Valley districts that might impact Hoover's spurge or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. The standard avoidance measures applied for vernal pool crustaceans may also protect sensitive vernal pool flora such as Hoover's spurge. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Palmate bracted bird's beak (*Cordylanthus palmatus*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact palmate bracted bird's beak or its habitat.

Kern Mallow (*Eremalche kernensis*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Kern Mallow or its habitat.

Hoover's eriastrum (*Eriastrum hooveri*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Hoover's eriastrum or its habitat.

Striped adobe-lily (*Fritillaria striata*). The LTCR will not result in the expansion of Cross Valley districts that might impact striped adobe lily or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

San Joaquin woolythreads (*Lembertia congdonii*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact San Joaquin wooly threads or its habitat.

Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). The LTCR will not result in the expansion of Cross Valley districts that might impact Bakersfield cactus or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*). The LTCR will not result in the expansion of Cross Valley districts that might impact San Joaquin Valley Orcutt grass or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. The standard avoidance measures applied for vernal pool crustaceans may also protect sensitive vernal pool flora such as San Joaquin Valley Orcutt grass. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Hartweg's golden sunburst (*Pseudobahia bahiifolia*). The LTCR will not result in the expansion of Cross Valley districts that might impact Hartweg's golden sunburst or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation

programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

San Joaquin adobe sunburst (*Pseudobahia peirsonii*). The LTCR will not result in the expansion of Cross Valley districts that might impact San Joaquin adobe sunburst or its habitat. Areas under active agriculture are expected to remain as such, and O&M is expected to continue along canals and other water delivery systems. No changes in impacts to native habitats are expected in districts that are known to have documented occurrences of this species. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Keck's checkerbloom (*Sidalcea keckii*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Keck's checkerbloom or its habitat.

Greene's tuctoria (*Tuctoria greenei*). This plant has not been documented as occurring within any districts of the Cross Valley CSA. The LTCR will not result in the expansion of Cross Valley districts that might otherwise impact Greene's tuctoria or its habitat.

EFFECTS ON SPECIAL-STATUS ANIMAL SPECIES

Crustaceans

Vernal pool fairy shrimp (*Branchinecta lynchi*). Federal Status: Threatened; State Status: None. Vernal pool fairy shrimp are known from many of the quadrangle areas that contain the Cross Valley CSA, but no recovery plan has been developed for vernal pool fairy shrimp, nor has critical habitat been designated. The LTCR will not change the boundaries of the districts within the Cross Valley CSA nor will any changes in water pricing effect vernal pools inhabited by vernal pool fairy shrimp since they typically occupy clear to tea-colored pools in unplowed grasslands. Under all the alternatives, O&M would continue. The standard avoidance measures for vernal pool crustaceans make the likelihood of impacting large pools unlikely. The USFWS has, however, determined that the continued O&M of the CVP could result in the loss of vernal pool crustaceans inhabiting as much as, but not more than 0.5 acres of vernal pools in any one county during a twelve-month period (USFWS 2000c). O&M activities at this level are unlikely to affect vernal pool fairy shrimp since they are only known from 32 locations, a quarter of which are represented by single pools typically occurring in grasslands. Since all contract renewals must include the take avoidance plans (Reclamation 2000), conservation programs, and other resource conservation programs of the CVPIA, none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Vernal pool tadpole shrimp (*Lepidurus packardi*). Federal Status: Endangered; State Status: None. Vernal pool tadpole shrimp are known from many of the quadrangle areas that contain the Cross Valley CSA, but no recovery plan has been developed for vernal pool tadpole shrimp, nor has critical habitat been designated. The LTCR will not change the boundaries of the districts within the Cross Valley CSA nor will any changes in water pricing effect vernal pools inhabited by vernal pool tadpole shrimp since they typically occupy clear water pools in grass-bottomed swales within grasslands. Under all the alternatives, O&M would continue. The standard avoidance measures for vernal pool crustaceans make the likelihood of impacting large pools unlikely. The USFWS has, however, determined that the continued O&M of the CVP could result in the loss of vernal pool crustaceans inhabiting as much as, but not more than 0.5 acres of vernal pools in any one county during a twelve-month period (USFWS 2000c). Since all contract renewals must include the take avoidance plans, conservation programs, and other resource conservation programs of the CVPIA (Reclamation 2000), none of the alternatives for LTCR are likely to jeopardize this species within the Cross Valley CSA.

Insects

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). Federal Listing Status: Threatened; State Listing Status: None. All of the contractors within the Cross Valley CSA are within the historic distribution of the valley elderberry longhorn beetle and recent records of their occurrence exist along Deer Creek and the San Joaquin, and Tule rivers that all flow through the Cross Valley CSA (CNDDB 2000). The only designated critical habitat for this species occurs along the American River, far north of the Cross Valley CSA. The USFWS has determined that continued O&M of the entire CVP could result in the loss of valley elderberry longhorn beetles inhabiting as many as "200 elderberry plants, each with at least one stem measuring 1.0 inch or greater in diameter at ground level, or 2,000 elderberry stems measuring 1.0 inch or greater in diameter at ground level along levees and canals due to routine maintenance annually" (Reclamation 2000). The USFWS determined that this level of anticipated take across the CVP was not likely to jeopardize the species or destroy or modify critical habitat, and neither will LTCR within the Cross Valley CSA. The increased flows and riparian restoration programs identified within the CVPIA and, therefore, applicable to all alternatives, should benefit the valley elderberry longhorn beetle.

Fish

Delta Smelt (*Hypomesus transpacificus*). Federal Status: Threatened; State Status: Threatened. The delta smelt does not occur within the Cross Valley CSA. Potential impacts to this species are indirect through the influence that the Cross Valley CSA may have on water quality and availability in the Sacramento-San Joaquin Delta system. Implementation of the proposed alternatives will not result in an increased effect on this this system. Since all contract renewals must include the take avoidance plans, conservation programs, and other resource conservation programs of the CVPIA

(Reclamation 2000), none of the alternatives for LTCR are likely to jeopardize this species.

Sacramento Splittail (Pogonichthys macrolepidotus). Federal Status: Threatened; State Status: None. Although the Cross Valley CSA is within the historical range of this species, the Sacramento splittail is not presently known to occur within the project area. Potential impacts to this species are indirect through the influence that the Cross Valley CSA has on water quality and flow levels in the San Joaquin River and the Sacramento-San Joaquin Delta system. Implementation of the proposed alternatives will not result in an increased effect on these systems. Since all contract renewals must include the take avoidance plans, conservation programs, and other resource conservation programs of the CVPIA (Reclamation 2000), none of the alternatives for LTCR are likely to jeopardize this species.

Amphibians

California Tiger Salamander (*Ambystoma californiense*). Federal Status: Proposed; State Status: None. California tiger salamanders are known from many of the quadrangle areas that contain the Cross Valley CSA. Since they have not been listed, no recovery plan exists for this species and no critical habitat has been designated. The California tiger salamander's preferred breeding habitat is pond environments persisting a minimum of three to four months on an annual basis. This description does not match many of the agricultural lands of the contractors within the Cross Valley CSA. Furthermore, the alternatives presented for the LTCR within the Cross Valley CSA are not likely to alter the habitats used by remnant populations of California tiger salamanders within the Division. This fact in addition to the requirements within the CVPIA for protection of species proposed for listing supports the conclusion that the alternatives for the LTCR within the Cross Valley CSA will not jeopardize the California tiger salamander.

California Red-legged Frog (*Rana aurora draytonii*). Federal Status: Threatened; State Status: None. The California red-legged frog has been extirpated from the area encompassed by the Cross Valley CSA. This conclusion is supported by the absence of any occurrences within this area in the California Natural Diversity Data Base (CNDDB 2000). The Cross Valley CSA is within the Sierra Nevada Foothills Recovery Unit for the frogs, but is outside of the core areas within the recovery unit. The nearest core areas are in western Merced and Fresno counties, west of U.S. Interstate Highway 5 (USFWS 2000a). Since the Cross Valley CSA is outside of these core areas, none of the proposed critical habitat for the red-legged frog occurs within the service area (USFWS 2000b). Since the California red-legged frog is absent from the Cross Valley CSA and outside of the core areas and proposed critical habitat for their recovery, none of the alternatives for LTCR in the Cross Valley CSA will destroy or adversely modify it's critical habitat, or are likely to jeopardize this species.

Reptiles

Blunt-nosed Leopard Lizard *(Gambelia sila).* Federal Status: Endangered; State Status: Endangered, Fully Protected. All of the contractors in the Cross Valley CSA are within the boundaries of the historical distribution of the blunt-nosed leopard lizard. The conversion of land for agricultural purposes within the contract service area has fragmented the suitable habitat for this species. The small patches that remain are not likely to be inhabited by blunt-nosed leopard lizards. It is still possible, however, that some blunt-nosed leopard lizards remain in the Cross Valley CSA. This is especially true in the Pixley Irrigation District, the Alpaugh Irrigation District, the Atwell Island Water District, and Lower Tule Irrigation District. The USFWS has determined that continued O&M of the CVP could result in the harassment of blunt-nosed leopard lizards inhabiting as much as, but no more than, 150 miles of CVP canals that may result from activities such as mowing along the canals" (USFWS 2000c). Blunt–nosed lizards are likely to avoid direct mortality from maintenance activities such as mowing, but maintenance activities may affect the foraging and reproduction by the lizard (USFWS 2000c). Each mile of canal bank shall only be mowed once on an annual basis; a level that should not jeopardize the species given the take avoidance plans, conservation program, and other resource conservation programs that exist with the CVPIA (USFWS 2000c). Since blunt-nosed leopard lizards are unlikely to occur in much of the Cross Valley CSA and all alternatives include the conservation components of the CVPIA (Reclamation 2000), LTCR for the Cross Valley CSA will not jeopardize this species.

Giant Garter Snake (*Thamnophis gigas*). Federal Status: Threatened; State Status: Threatened. Giant garter snakes are susceptible to maintenance activities associated with the CVP (USFWS 2000c). Garter snakes in general are susceptible to mortality during mowing because of their behavior of retreating into burrows when disturbed and then leaving the burrow as the disturbance increases. Each mile of the canal is to be mowed no more than once per year under the alternatives (USFWS 2000c) and furthermore, giant garter snakes are more likely to escape into canals in response to this disturbance than most species of garter snakes. Dredging of canals and the placement of dredge spoils on canal tops or banks can bury the habitat of the giant garter snake and in some cases the snake itself. It is estimated that dredging throughout the entire CVP canal system will not bury more than one linear mile of aquatic garter snake habitat on an annual basis (USFWS 2000c). Since giant garter snakes are not known to currently occur within the Cross Valley CSA, the LTCR and continued maintenance of the canals will not jeopardize this species.

Birds

California Condor (*Gymnogyps californianus*). Federal Status: Endangered; State Status: Endangered, Fully Protected. Much of the Cross Valley CSA is in the historical range of the California Condor. Condors are unlikely to use the areas that encompass the Cross Valley CSA very often, however, because they are more likely to circumnavigate the valley floor. Current land use and human encroachment within the contract areas of the Cross Valley CSA makes it highly unlikely that California Condors

would forage there, even in the event that they eventually become reestablished in parts of their former range. Since the boundaries of the Cross Valley CSA will not change as result of LTCR and no major changes are expected to occur in land use, none of the alternatives for LTCR within the Cross Valley CSA will jeopardize this species.

Bald Eagle (*Haliaeetus leucocephalus*). Federal Status: Proposed for Delisting; State Status: Endangered. Bald Eagles are likely to occur only as a rare winter migrant in the Cross Valley CSA and no major changes are expected to occur in land use that might affect their current use of the area. Consequently, none of the alternatives within the LTCR for the Cross Valley CSA will jeopardize this species.

Swainson's Hawk (*Buteo swainsoni*). Federal Status: None; State Status: Threatened. Swainson's Hawks are known to be present within the boundaries or adjacent to the Atwell Island Water District, and the Pixley, Alpaugh, and Lower Tule irrigation districts (CNDDB 2000). No critical habitat has been designated for this species and none of the alternatives for LTCR in the Cross Valley CSA will jeopardize this species, or destroy or adversely modify it's suitable habitat. In fact, the riparian habitat restoration component of the CVPIA could potentially benefit Swainson's Hawks by increasing available nesting habitat.

Least Bell's Vireo (*Vireo bellii pusillus*). Federal Status: Endangered; State Status: Endangered. The Least Bell's Vireo has been extirpated from the San Joaquin Valley (Franzreb 1987). This conclusion is supported by the absence of recent records of Least Bell's Vireos within the Cross Valley CSA (CNDDB 2000) and the decision by the USFWS to focus recovery efforts on protecting existing habitat within Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties. Since the Least Bell's Vireo is absent from the Cross Valley CSA, which is outside the boundaries of the current recovery efforts and designated critical habitat, none of the alternatives for LTCR in the Cross Valley CSA will jeopardize this species, or destroy or adversely modify it's critical habitat.

Mammals

San Joaquin Antelope Squirrel (*Ammospermophilus nelsoni*). Federal Status: None; State Status: Threatened. While the Atwell Island Water District, and the Pixley, Alpaugh and Lower Tule irrigation districts are all within the historic range of the San Joaquin antelope squirrel, the species is currently restricted to the Coast Range on the western edge of the San Joaquin Valley. Thus, none of the alternatives for LTCR will jeopardize the San Joaquin antelope squirrel.

Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*). Federal Status: Endangered; State Status: Endangered. Portions of the Lower Tule Irrigation District, the Pixley Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District are within the boundaries of the historic distribution of the Tipton kangaroo rat. Maintenance activities during the breeding season are likely to disrupt reproduction and affect foraging of Tipton kangaroo rats since they are very sensitive to sound (USFWS

2000c). The take avoidance measures within the CVPIA and the limit on mowing each mile of canal just once per year greatly reduce the risk to this species due to normal O&M (USFWS 2000c). Recovery efforts for this species are focused on habitat management and the protection of areas of natural or restored habitat in a configuration that will perpetuate viable populations. Renewal of the contracts within the Cross Valley CSA will not expand the boundaries into these habitats or result in land use changes that would affect these habitats. Therefore, no jeopardy to this species is likely to result from any of the alternatives for LTCR in the Cross Valley CSA.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Status: Endangered; State Status: Threatened. All of the contractors in the Cross Valley CSA are within the boundaries of the historical distribution of the San Joaquin kit fox. The conversion of land for agricultural purposes within the contract service area has led to a reduction in the size of suitable areas for this species. Therefore, while small patches of suitable habitat exists in the Cross Valley CSA, they are unlikely to be inhabited by San Joaquin kit foxes. Remnant populations of San Joaquin kit fox within the Cross Valley CSA are still a possibility, especially in the Lower Tule Irrigation District, the Pixley Irrigation District, the Alpaugh Irrigation District, and the Atwell Island Water District. The recovery strategy for the San Joaquin kit fox is dependent on the enhanced protection and management of three geographically distinct core populations outside of the Cross Valley CSA. The conservation and take avoidance measures for the San Joaquin kit fox contained within the CVPIA (USFWS 2000c) applies to all of the alternatives (Reclamation 2000) and has previously been determined to lead to a no jeopardy situation with regards to normal O&M. Renewal of the long-term contracts, as described in any of the alternatives, will not jeopardize this species or the recovery efforts for this species.

SENSITIVE SPECIES AND SPECIES-OF-CONCERN

Plants and Animals

Long-Term Contract Renewal, as described in the three Alternatives, is not expected to effect individual plants and animals or significantly convert, degrade, or fragment their suitable habitat because no large scale changes in land use is predicted. Moreover, the management of the Cross Valley CSA will continue to operate under the existing conditions that include the conservation measures within the CVPIA. Consequently, Alternatives considered in the LTCR for the Cross Valley CSA will not jeopardize the Federal Sensitive Species, State Species-of-concern, or the State Fully Protected Species.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future local, state, and private actions on Endangered and Threatened species or critical habitat that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the proposed action (e.g., non-CVP Reclamation projects, Corps or Engineers projects, and U.S. Forest Service or Bureau of Land Management actions) are not considered here because they require separate consultation pursuant to Section 7 of the ESA.

Actions that could threaten listed and proposed Threatened and Endangered animal and plant species include: oil and gas development; mining or quarrying for sand, gravel, or minerals; liquid waste treatment plants; wind farms; pipeline installation; transmission line installation; creation of reservoirs or evaporation ponds; construction of roads or other transportation infrastructure; urban or industrial developments; or agricultural conversion (USFWS 2000C). Listed and proposed animal species are also affected by poisoning, shooting, increased predation associated with human development, and reduction of food sources. These actions are expected to continue and the cumulative effects of these actions on many species are predicted to be severe enough to substantially reduce the likelihood of long-term survival and recovery of listed species (USFWS 2000c). The LTCR and continued operation and maintenance of the CVP would contribute to the threat to these species if it were not for the Reclamation's Endangered Species Act compliance strategy (USFWS 2000c). This strategy is designed to "minimize further loses within the CVP service areas and to offset impacts from ongoing CVP operations". The operational procedures under the CVPI, take avoidance and compensation measures for the blunt-nosed leopard lizard, giant garter snake, giant and Tipton kangaroo rats, San Joaquin kit fox, vernal pool crustaceans, and valley elderberry longhorn beetle (USFWS 2000c Appendices F and G, respectively), and conservation measures such as the issuance of notices to all contractors regarding the need to protect all remaining habitat of listed species in the service area and the completion of a comprehensive mapping of all lands in the service area to identify all remaining potential habitat for listed species should lessen adverse impacts of future activities that would otherwise jeopardize the survival of listed Threatened and Endangered or Proposed species within the Cross Valley Contractors service area (USFWS 2000c). Furthermore, Reclamation has adopted an adaptive strategy in the implementation of recovery and enhancement actions to hasten the recovery of species within the Central Valley (USFWS 2000c). The general cumulative affects associated with individual habitats and select topics are discussed below.

Delta Aquatic Habitats

Delta fishes continue to be adversely affected by entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, destruction of spawning and refugial areas, change in the hydrologic patterns in Delta waterways, and constriction of low salinity habitat to deep-water river channels of the interior Delta. Cumulative effects on the delta smelt and Sacramento splittail include continuing and future diversions of water that may entrain adult or larval fish or that may decrease outflows incrementally, thus shifting the position of these fish species preferred habitat upstream. Water diversions through intakes serving numerous small private agricultural lands and duck clubs, and municipal and industrial uses contribute to these cumulative effects.

Other cumulative effects include: wave action in the water channel caused by boats, dumping of domestic and industrial garbage, reduction of habitat and introduction of pesticides and herbicides from golf courses, oil and gas production, levee maintenance

and agricultural uses on levees, unscreened agricultural diversions, grazing activities, and point and non-point source chemical contaminant discharges.

Vernal Pools

Limited distributional patterns increase the susceptibility of individual populations and entire species associated with vernal pools to declines from both natural and human-induced disturbances. Vernal pool habitat is expected to be further degraded in the future by fragmentation resulting from agricultural and urban development, changes in hydrologic patterns, off-road vehicle use, increased competition form non-native species, periodic drought, mosquito abatement, gravel mining, flood control and water conveyance projects, pipeline projects, reservoir construction, intensive livestock grazing, and refuse disposal (USFWS 2000c).

Freshwater Wetland and Riparian Habitats

Freshwater wetlands continue to be drained for agricultural and urban use, and inundated by reservoirs and converted to open water habitat. Factors contributing to the loss of riparian habitat include: continued conversion of non-irrigated land to irrigated agriculture, levee construction and maintenance, bank erosion, browsing by livestock, use of riprap for bank protection, groundwater extraction, flow regulation, and development of land along the riparian corridor.

Interior Grassland and Alkali Scrub Habitats

Grasslands continue to be degraded or converted as a result of unsustainable grazing practices, urban expansion, and conversion to irrigated croplands. Alkali scrub habitats continue to decline because of agricultural conversion, flood control, and groundwater pumping.

Contaminants and Water Quality

Agricultural and industrial activity can introduce contaminants into water used by threatened and endangered species. Contaminants may enter surface waters through point source spills and discharges, urban and agricultural runoff, deposition of atmospheric aerosols, and dredging that releases contaminants trapped in sediments. The major source of water contamination in the Central Valley is agricultural drainwater that has high salinity, high selenium concentrations, and pesticides. Waters could also be contaminated by incidental leakage of gasoline and oil from vehicles and storage tanks, illegal dumping of waste oil, or accidental spills of chemicals or fuel from tank trucks or rail cars.

Exotic Species

Exotic species continue to spread and threaten the viability of native species. Bullfrogs pose a threat to a variety of aquatic species including fish, snakes, and other species of

and agricultural uses on levees, unscreened agricultural diversions, grazing activities, and point and non-point source chemical contaminant discharges.

Vernal Pools

Limited distributional patterns increase the susceptibility of individual populations and entire species associated with vernal pools to declines from both natural and human-induced disturbances. Vernal pool habitat is expected to be further degraded in the future by fragmentation resulting from agricultural and urban development, changes in hydrologic patterns, off-road vehicle use, increased competition form non-native species, periodic drought, mosquito abatement, gravel mining, flood control and water conveyance projects, pipeline projects, reservoir construction, intensive livestock grazing, and refuse disposal (USFWS 2000c).

Freshwater Wetland and Riparian Habitats

Freshwater wetlands continue to be drained for agricultural and urban use, and inundated by reservoirs and converted to open water habitat. Factors contributing to the loss of riparian habitat include: continued conversion of non-irrigated land to irrigated agriculture, levee construction and maintenance, bank erosion, browsing by livestock, use of riprap for bank protection, groundwater extraction, flow regulation, and development of land along the riparian corridor.

Interior Grassland and Alkali Scrub Habitats

Grasslands continue to be degraded or converted as a result of unsustainable grazing practices, urban expansion, and conversion to irrigated croplands. Alkali scrub habitats continue to decline because of agricultural conversion, flood control, and groundwater pumping.

Contaminants and Water Quality

Agricultural and industrial activity can introduce contaminants into water used by threatened and endangered species. Contaminants may enter surface waters through point source spills and discharges, urban and agricultural runoff, deposition of atmospheric aerosols, and dredging that releases contaminants trapped in sediments. The major source of water contamination in the Central Valley is agricultural drainwater that has high salinity, high selenium concentrations, and pesticides. Waters could also be contaminated by incidental leakage of gasoline and oil from vehicles and storage tanks, illegal dumping of waste oil, or accidental spills of chemicals or fuel from tank trucks or rail cars.

Exotic Species

Exotic species continue to spread and threaten the viability of native species. Bullfrogs pose a threat to a variety of aquatic species including fish, snakes, and other species of

frogs. Exotic plants compete with native plants for light, space, and nutrients and the lack of natural population controls for these exotics enable them to exclude native species in some cases. Examples of such species include Brazilian elodea (*Egeria densa*) and yellow star thistle (*Centaurea solstitialis*).

Native Habitat Conversion and Associated Activities

Native habitat continues to be converted by: oil and gas development; mining or quarrying for sand, gravel, or minerals; liquid waste treatment plants; wind farms; pipeline installation; transmission line installation; creation of reservoirs or evaporation ponds; construction of roads or other transportation infrastructure; urban or industrial developments; or agricultural conversion. The conversion of land for agricultural purposes continues to be the most critical threat to listed species, although the increment of habitat loss attributable to urban development appears to be increasing (USFWS 2000c).

During habitat conversion listed species could be killed or injured by operation of equipment or flooding. Construction activities can disrupt individual foraging or breeding behavior or alter daily activity patterns and increase energetic demands. These disruptions in conjunction with a loss of habitat are expected to result in reductions in individual fitness and reproductive output. Habitat conversion also reduces the availability of suitable habitat for future recovery of species and isolates populations by increasing habitat fragmentation.

Conversion of native habitats also results in host of associated activities that adversely effect listed species. Increased vehicle traffic, introduction of domestic and/or feral animals, hydrological changes, and the transformation of watercourses are just a few examples.

CONCLUSION AND DETERMINATION

Because no large-scale changes are predicted to occur, long-term contract renewal, as discussed under the three Alternatives, is not likely to result in significant effects to plant and animal species or in significant conversion, degradation, or fragmentation of their suitable habitats within the Friant Division. Likewise, actions considered under the Alternatives are not likely to affect the continued existence of current or proposed threatened or endangered species or of designated or proposed critical habitat.

Under all three Alternatives, the Friant Division will continue to operate under existing management conditions that include built in conservation measures of the CVPIA. In addition, the Endangered Species Act compliance strategy developed jointly between the U.S. Fish and Wildlife Service and Reclamation is designed to minimize further losses within the CVP areas and to offset impacts from ongoing CVP operations (USFWS 2000c). Through these measures, actions and operations of the CVP should lessen adverse impacts of state, local and private activities that might otherwise jeopardize the survival and recovery of special-status species within the Friant Division.

LITERATURE CITED

Arnold, R. A., J. A. Halstead, D. Kavanaugh, and K. H. Osborne. 1994. Pages 414-415. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

Arnold, S. J., and T. Halliday. 1986. Life history notes: *Hyla regilla*, predation. Herpetological Review 17(2):44.

Baldwin, K. S., and R. A. Stanford. 1987. Life history notes: *Ambystoma tigrinum californiense*, predation. Herpetological Review 18(2):33.

Barbour, R.W., and W.H. Davis. 1969. Bats of America. University of Kentucky Press, Louisville. 285 p.

Beatley, J. C. 1969. Dependence of desert rodents on winter annuals and precipitation. Ecology 50:721-724.

Bent, A. C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. Smithsonian Institution, U.S. National Museum, Bulletin 197. 411 p.

Berry, W. H., J. H. Scrivner, T. P. O'Farrell, C. E. Harris, T. T. Kato, and P. M. McCue. 1987. Sources and rates of mortality of the San Joaquin kit fox, Naval Petroleum Reserve #1, Kern County, CA, 1980-1986. Rep. No. EGG 10282-2154, EG&G Energy Measurements, Goleta, CA. 34 p.

Bloom, P. H. 1980. The Status of the Swainson's Hawk in California, 1979. Federal Aid in Wildlife Restoration, Project W-54-R-12, Final Report 11-8-0. California Department Of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section. Sacramento, CA. 24 p.

Brylski, P., and A. I. Roest. 1994. Fresno kangaroo rat. Pages 76-77. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

Brylski, P., B. L. Cypher, A. I. Roest, and C. Uptain. 1994. Tipton kangaroo rat. Pages 78-79. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

California Native Plant Society. 1994. Inventory of Rare and Endangered Vascular Plants of California. Edited by M.W. Skinner and B. Pavlik.

Clendenen, D., L. Kiff, and R. Mesta. 1994. California condor. Pages 140-143. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide to

California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

CNDDB. 2000. California Natural Diversity Data Base. California Department of Fish and Game. Sacramento, CA.

Culbertson, A. E. 1946. Observations of the natural history of the Fresno kangaroo rat. J. Mammal. 27:189-203.

Cypher, B. L., and J. H. Scrivner. 1992. Coyote control to protect endangered San Joaquin kit foxes at the Naval Petroleum Reserves, California. Pages 42-47. In Borrecco J. E., and R. E. Marsh, editors. Proceeding of the 15th Vertebrate Pest Conference. Newport Beach, CA.

Cypher, B. L., and K. A. Spencer. 1998. Competitive interactions between coyotes and San Joaquin kit foxes. J. Mamm. 79:204-214.

Dahl, T. E. 1990. Wetland losses in the United States, 1780s to 1980s. U.S. Fish and Wildlife Service, Washington, D.C. 13 p.

Dennis, B. 1989. Allee effects: population growth, critical density, and the chance of extinction. Natural Resource Modeling 3:481-538.

Dennis, B., and M. R. M. Otten. 2000. Joint effects of density dependence and rainfall on abundance of San Joaquin kit fox. J. Wildl. Manage. 64(2):388-400.

Detrich, P. J. 1985. The status and distribution of the Bald Eagle in California. M.S. Thesis, California State University, Chico. 101 p.

Dragoo, J. W., J. R. Choate, T. L. Yates, and T. P. O'Farrell. 1990. Evolutionary and taxonomic relationships among North American arid-land foxes. J. Mamm. 71:318-322.

Edwards, C. C. 1969. Winter behavior and population dynamics of American eagles in Utah. Ph.D. Thesis. Brigham Young University, Provo, Utah. 156 p.

Eng, L. L., D. Belk, and C. H. Eriksen. 1990. California Anostraca: Distribution, habitat, and status. Journal of Crustacean Biology 10:247-277.

Estep, James A. 1989. Biology, Movements and Habitat Relationships of the Swainson's Hawk in the Central Valley of California, 1986-1987. California Department Of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section. Sacramento, CA. 52 p.

Fisher, R., G. Hansen, R. W. Hansen, and G. Stewart. 1994. Giant garter snake. Pages 284-287. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide

to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

Fowler, C. W., and J. D. Baker. 1991. A review of animal population dynamics at extremely reduced population levels. Report of the International Whaling Commission 41:545-554.

Franzreb, K. J. 1987. Endangered status and strategies for conservation of the Least Bell's Vireo (*Vireo bellii pusillus*) in California. Western Birds 18:3-49.

Franzreb, K., J. Greaves, and R. McKernan. 1994. Least Bell's Vireo. Pages 216-217. In Thelander, C. G., and M. Crabtree, editors. Life on the edge: a guide to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

Gaines, D., R. Duke, and L. R. Mewaldt. 1990. Bell's Vireo. Pages 550-551. In Zeiner, D. C, W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, editors. California's Wildlife, Volume II Birds. State of California, Department of Fish and Game, Sacramento, CA. 732 p.

Gilpin, M. E., and M. E. Soule. 1986. Minimum viable populations: processes of species extinction. Pages 19-34. In Soule M. E., editor. Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, MA.

Golightly, R. T., and R. D. Ohmart, 1984. Water economy of two desert canids: coyote and kit fox. J. Mamm. 65:51-58.

Grier, J. W. 1974. Reproduction, organochlorines, and mercury in northeastern Ontario Bald Eagles. Can. Field-Nat. 88469-475.

Grinnell, J., J. S. Dixon, and J. M. Linsdale. 1937. Fur-bearing mammals of California: their natural history, systematic status, and relations to man. Volume 2. University of California Press, Berkeley, CA.

Grinnell, J., and A. H. Miller. 1944. The Distribution of the Birds of California. Cooper Ornithological Club. Pacific Coast Avifauna: No. 27.

Hansen, G. E., and J. M. Brode. 1980. Status of the Giant Garter Snake *Thamnophis couchi gigas* (Fitch). State of California, The Resources Agency, Department of Fish and Game. Special Publication 80-5.

Hayes, M. P., and M. M. Miyamoto. 1984. Biochemical, behavioral and body size difference between *Rana aurora aurora* and *R. a. draytonii*. Copeia 1984(4):1018-1022.

Hayes, M. P., and M. R. Tennant. 1985. Diet and feeding behavior of the California red-legged frog, *Rana aurora draytonii* (Ranidae). The Southwestern Naturalist, 30(4): 601-605.

Hayes, M. P., and M. R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): implications for management. Pages 144-158. In: Sarzo, R., K. E. Severson, and D. R. Patton, technical coordinators. Proceedings of the symposium on the management of amphibians, reptiles, and small mammals in North America. United States Department of Agriculture, Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. General Technical Report (RM-166): 1-458.

Hickman, J. C. 1993. The Jepson Manual: Higher Plants of California. University of California Press.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game, Sacramento, CA. 156 p.

Jameson, E.W. jr., and H. J. Peeters. 1988. California Mammals. University of California Press, Berkeley, California. 403 p.

Jennings, M. R. 1988. Natural history and decline of native ranids in California. Pages 61-72. In: De Lisle, H. F., P. R. Brown, B. Kaufman, and B. McGurty, editors. Proceedings of the Conference On California Herpetology. Southwestern Herpetologists Society, Special Publication, (4):1-143.

Jennings, M. R., and M. P. Hayes. 1990. Final report of the status of the California red-legged frog (*Rana aurora draytonii*) in the Pescadero Marsh Natural Preserve. Final report prepared for the California Department of Parks and Recreation, Sacramento, California, through Agreement (4-823-9018). Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California. 56 p.

Jennings, M. R., and M. P. Hayes. 1994a. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 p.

Jennings, M. R., and M. P. Hayes. 1994b. The decline of native ranid frogs in the desert southwest. Pages 183-211. In: P. R. Brown and J. W. Wright, editors. Herpetology of the North American Deserts: Proceedings of a Symposium. Southwestern Herpetologists Society, Special Publication (5): 300 p.

Johnston, D.S. 1997. Foraging flexibility in the pallid bat (Antrozous pallidus). Ph.D. Dissertation. York University, Toronto, Canada. 167 p.

Koford, C. B. 1953. The California Condor. National Audubon Society Research Report 4. 154 p.

Koos, K. A. 1979. Food relationships of an alkali sink rodent community. M.A. Thesis, California State Univ., Fresno. 45 p.

Livezey, R. L., and A. H. Wright. 1947. A synoptic key to the salientian eggs of the United States. The American Midland Naturalist, 37(1):179-222.

Mayer, K. E., and W. F. Laudenslayer. 1988. A guide to wildlife habitats of California. California Department of Forestry and Fir Protection, Sacramento, CA. 166 p.

McGrew, J. C. 1979. Vulpes macrotis. Mammalian Species No. 123.

Mercure, A. K, K. Ralls, K. P. Koepfli, and R. B. Wayne. 1993. Genetic subdivisions among small canids; mitochondrial DNA differentiation of swift, kit, and arctic foxes. Evolution 47:1313-1328.

Meretsky, V. J., and N. F. R. Snyder. 1992. Range use and movements of California Condors. Condor 94:313-335.

Miller, K. J. 1994. Endangered and threatened wildlife and plants; proposed endangered status for the California red-legged frog. Federal Register, 59(22):4888-4895.

Miller, K. J., A. Willy, S. Larsen, and S. Morey. 1996. Endangered and threatened wildlife and plants; determination of threatened status for the California red-legged frog. Federal Register, 61(101):25813-25833.

Montanucci, R. R. 1965. Observations on the San Joaquin leopard lizard, *Crotaphytus wislizenii silus* Stejneger. Herpetologica 21:270-283.

Montanucci, R. R. 1970. Analysis of hybridization between *Crotaphytus wislizenii* and *Crotaphytus silus* (Sauria:Iguanidae) in California. Copeia 1970:104-123.

Morey, S. 1988. Tiger Salamander. Pages 2-3. In: Zeiner D. C., W. F. Laudenslayer, K. E. Mayer, and M. White, editors. California's Wildlife Volume 1, Amphibians and Reptiles. State of California, The Resources Agency California Fish and Game, Sacramento, CA.

Morrell, S. 1972. Life history of the San Joaquin kit fox (*Vulpes macrotis mutica*). Calif. Fish and Game Bull. 58:162-174.

Morrell, S. 1975. San Joaquin kit fox distribution and abundance in 1975. Administrative Report 75-3, California Department of Fish and Game, Sacramento, CA.

Morrison, M. L., and D. Van Vuren. 1993. Ecological relationships of ground squirrels at the Concord Naval Weapons Station. Contract Number N62474-92-LT-00L05, Final report to Western Division, Naval Facilities Engineering Command, San Bruno, CA.

Moyle, P.B. 1976. Inland fishes of California. University of California Press, Berkeley. 405 p.

Moyle, P.B., and R. Yoshoyama, J.E. Williams, and E.D. Wikramanayake. 1995. Fish Species of Special Concern in California. Second Edition. California Department of Fish and Game. Rancho Cordova. 272 p.

O'Farrell, T. P., T. Kato, P. McCue, and M. S. Sauls. 1980. Inventory of the San Joaquin kit fox on BLM lands in southern and southwestern San Joaquin Valley. Final Report, ECC 1183-2400, EG&C, Santa Barbara Operations, U.S. Department of Energy, Goleta, CA.

O'Farrell, T. P., and P. McCue. 1981. Inventory of the San Joaquin kit fox on BLM lands in western San Joaquin Valley. Final Report, ECC 1183-2416, EG&C, Santa Barbara Operations, U.S. Department of Energy, Goleta, CA.

Orloff, S., F. Hall, and L. Spiegel. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of their range. Trans. Western Sect. Wildl. Soc. 22: 60-70.

Pennak, R. W. 1989. Fresh-water Invertebrates of the United States: Protozoa to Mollusca. John Wiley & Sons, Inc., New York, NY.

Ralls, K., P. J. White, J. Cochran, and D. B. Siniff. 1990. Kit fox-coyote relationships in the Carrizo Plain Natural Area. Annual report to the U. S. Fish and Wildlife Service, Sacramento, CA.

Rathbun, G. B., M. R. Jennings, T. G. Murphey, and N. R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico Creeks, San Luis Obispo County, California. Final report prepared for the California Department of Parks and Recreation, San Simeon Region, through Cooperative Agreement (14-16-0009-01-1909). U.S. Fish and Wildlife Service, National Ecology Research Center, Piedras Blancas Research Station, San Simeon, California. 103 p.

Rhodehamel, W. M. 1991. A management oriented study of habitat on and effects of boating activities on wintering Bald Eagles, Millerton Lake State recreational Area, California. California State University, Fresno. 75 p.

Scrivner, J. H., T. P. O'Farrell, T. T. Kato, and M. K. Johnson. 1987. Dispersal of San Joaquin kit foxes, *Vulpes macrotis mutica*, on Naval Petroleum Reserve #1, Kern

County, California, 1980-184. Rep. No. EGG 10282-2168, EG&G Energy Measurements, Goleta, CA, 32 p.

Semlitsch, R. D. 1983. Structure and dynamics of two breeding populations of the Eastern tiger salamander, *Ambystoma tigrinum*. Copeia 1983:608-616.

Semlitsch, R. D. 1985. Analysis of climatic factors influencing migrations of the salamander, *Ambystoma talpoideum*. Ibid. 1985:477-489.

Semlitsch, R. D. and H. M. Wilbur. 1988. Effects of pond drying time on metamorphosis and survival in the salamander, *Ambystoma talpoideum*. Copeia 1988:978-983.

Skinner, M.W., and B.M. Pavlik. 1994. California Native Plant Society Inventory of Rare and Endangered Vascular Plants of California. 5th edition. Special Publication No. 1. California Native Plant Society. Sacramento, California.

Snyder, N. F. R., and H. A. Snyder. 1988. Biology and conservation of the California Condor. Current Ornithology (6). New York: Plenum Press.

Spiegel, L. K., and M. Bradbury. 1992. Home range characteristics of the San Joaquin kit fox in Western Kern County, California. Trans. Western Sect. Wildl. Soc. 2:83-92.

Stebbins, R. C. 1954. Amphibians and reptiles of Western North America. McGraw-Hill Book Co., Inc., New York. 52 p.

Stebbins, R. C. 1985. A field guide to western reptiles and amphibians. Second edition (revised). Houghton Mifflin Company, Boston, MA, 336 p.

Storer, T. I. 1925. A synopsis of the Amphibia of California. University of California Publications in Zoology, 27:1-1-342.

Sugnet & Associates. 1993. Preliminary compilation of documented distribution, fairy shrimp and tadpole shrimp proposed for listing. April 29, 1993.

Suydam, R. S. and E. T. Conrad. 1985. Wintering Bald Eagles at Millerton Fresno/Madera Counties. California Department of Parks and Recreation, Millerton Lake State Recreation Area, CA. 42 p.

Thelander, C. G. 1973. Bald Eagle reproduction in California, 1972-1973. State of California, The Resources Agency, Department of Fish and Game. Wildl. Manage. Branch Admin. Rep.#73-5. 17 p.

Thelander, C. G., and M. Crabtree. 1994. Life on the edge: a guide to California's endangered natural resources: wildlife. BioSystems Books, Santa Cruz, CA. 550 p.

Tollestrup, K. 1979. Distribution of *Gambelia silus* (blunt-nosed leopard lizard) in the western foothills of the San Joaquin Valley. U.S. Bureau Land Management, Sacramento, CA Unpubl. Rep., 18 p.

Tollestrup, K. 1982. Growth and reproduction in two closely related species of leopard lizards, Gambelia silus and Gambelia wislizenii. Amer. Midl. Nat. 108:1-20.

Tollestrup, K. 1983. The social behavior of two closely related leopard lizards, *Gambelia silus* and *Gambelia wislizenii*. J. Tierpsychol. 62:307-320.

Uptain, C., W. A. Clark, and S. M. Juarez. 1985. Mark-recapture population estimates and visitation indices for the blunt-nosed leopard lizard, *Gambelia silus*, at the Pixley National Wildlife Refuge. U.S. Fish and Wildlife Service, Delano, CA, Contract Nos. 10181-9810-3(js) and 10181-4672-4, 34 p.

U.S. Bureau of Reclamation (Reclamation). 2000. Cross Valley Contractors Long-Term Contract Renewal Draft Environmental Assessment, Draft. October 11, 2000 Mid-Pacific Region, Fresno, CA. 220p.

U.S. Fish and Wildlife Service (USFWS). 1967. Native fish and wildlife. Endangered species. Fed. Register 32:4001.

U.S. Fish and Wildlife Service (USFWS). 1980. Blunt-nosed leopard lizard recovery plan. U.S. Fish and Wildlife Service, Portland, OR. 62 p.

U.S. Fish and Wildlife Service (USFWS). 1985a. Blunt-nosed leopard lizard revised recovery plan. U.S. Fish and Wildlife Service, Portland OR. 85 p.

U.S. Fish and Wildlife Service (USFWS). 1985b. Endangered and threatened wildlife and plants; determination of endangered status and critical habitat for the Fresno kangaroo rat. Fed. Register 50:4222-4226.

U.S. Fish and Wildlife Service (USFWS). 1986. Final rule to designate the Least Bell's Vireo as an endangered species. Fed. Register 51:16474-16482.

U.S. Fish and Wildlife Service (USFWS). 1988. Endangered and threatened wildlife and plants; determination of endangered status for the Tipton kangaroo rat. Fed. Register 53:25608-25611.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and threatened wildlife and plants: notice of review. Federal Register 56:58804.

U.S. Fish and Wildlife Service (USFWS). 1994. Endangered and threatened wildlife and plants; determination of endangered status for the Conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool tadpole shrimp; and threatened status for the vernal pool fairy shrimp. Fed. Register 59:48136-48171.

U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and threatened wildlife and plants: determination of threatened status for the California red-legged frog. Federal Register 61(101):25813-25833.

U.S. Fish and Wildlife Service (USFWS). 1998. Recovery plan for upland species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 p.

U.S. Fish and Wildlife Service (USFWS). 1999. Striped adobe-lily (*Fritillaria striata*) Tree-anemone (*Carpenteria californica*). Federal Register **PAGE NUMBERS.**

U.S. Fish and Wildlife Service (USFWS). 2000a. Draft recovery plan for the California red-legged frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. 258 p.

U.S. Fish and Wildlife Service (USFWS). 2000b. Endangered and threatened wildlife and plants; proposed designation of critical habitat for the California red-legged frog (*Rana aurora draytonii*); proposed rule. Federal Register 65 (176): 54892-54932.

U.S. Fish and Wildlife Service (USFWS). 2000c. Draft biological opinion on the operation and maintenance of the Central Valley Project and implementation of the Central Valley Project Improvement Act. February 1, 2000. Sacramento, CA.

Verner, J. 1978. California condors: status of the recovery effort. Gen. Tech. Rep. PSW-28, Pacific Southwest Forest and Range Experiment Station., Forest Service., U.S. Department of Agriculture, Berkeley, CA. 30 p.

Verner, J., and A. S. Boss. 1980. California wildlife and their habitats: western Sierra Nevada. Gen. Tech. Rep. PSW-37, Pacific Southwest Forest and Range Experiment Station., Forest Service., U.S. Department of Agriculture, Berkeley, CA. 439 p.

Williams, D. F. 1986. The Mammalian Species of Special Concern in California. California Department. of Fish and Game. Sacramento,CA. 112 p.

White, P. J., and K. Ralls. 1993. Reproduction and spacing patterns of kit foxes relative to changing prey availability. J. Wildl. Manage. 57:861-867.

White, P. J., C. A. Vanderbilt White, and K. Ralls. 1996. Functional and numerical responses of kit foxes to a short-term decline in mammalian prey. J. Mamm. 77:370-376.

White, P. J., and R. A. Garrott. 1997. Factors regulating kit fox populations. Canadian J. Zoology 75:1982-1988.

Wright, A. H., and A. A. Wright. 1949. Handbook of frogs and toads of the United States and Canada. Third edition. Comstock Publishing Company, Inc., Ithaca, New York. 640 p.

LIST OF CONTACTS/CONTRIBUTORS/PREPARERS

Preparers

Ronald R. Duke, M.S., President, Senior Wildlife Ecologist
Patrick Boursier, Ph. D., Division Head, Senior Wetland Ecologist
Kent Smith, B.S., Project Manager, Senior Wildlife Biologist
Mary Bacca, M.S., Senior Plant Ecologist
Brian B. Boroski, Ph.D., Senior Wildlife Ecologist
Jeff Seay, B.S., Wildlife Biologist
Andrew Dilworth, B.S., Botanist
Mark Jennings, Ph.D. Associate Herpetologist

APPENDIX A.

FEDERAL AND STATE ENDANGERED AND THREATENED PLANTS, OR PLANTS PROPOSED FOR LISTING THAT OCCUR OR ARE LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA

Appendix A. Federal and State Endangered, Threatened, or Proposed Plant Species Documneted within U.S.G.S. Quadrangle Areas Containing Portions of Districts within the Cross Valley Contract Service Area.

Cross Valley Contractor	Cross Valley Subcontractor	Bakersfield smallscale	Kaweah brodiaea	Succulent Owl's Clover	California jewelflower	Hoover's spurge	Palmate-bracted bird's beak	Kern Mallow	Hoover's eriastrum	Stiped adobe lily	San Joaquin woolly-threads	Bakersfield cactus	San Joaquin Valley Orcutt grass	Hartweg's Golden Sunburst	San Joaquin adobe sunburst	Keck's checkerbloom	Green's Tuctoria
County of Fresno	Fresno County Waterworks # 34		A										X	X	A		A
County of Tulare	Alpaugh Irrigation District				A			A			A						
	Atwell Island Water District				A			A			A						
	City of Lindsay																
	City of Visalia																
	Hills Valley Irrigation District												X			A	
	Sausalito Irrigation District				X					X					X	A	
	Smallwood Vineyards									A					A	A	
	Stone Corral Irrigation District					X							X		X		
	Strathmore P.U.D.				A	A				A					X	A	
	Styro-Tek, Inc.				X												
Hills Valley Irrigation District													X			A	
Kern-Tulare Irrigation District					X					A	A	X			A	A	
Lower Tule River Irrigation District					X					X					X	A	
Pixley Irrigation District					X					A					A		
Rag Gulch Water District					X					A	A				A		
Tri-Valley Water District													X		X	A	

Key: 'X' indicates one or more occurrences within quadrangle areas contained by the specific district of the Cross Valley Contractors.
'A' indicates one or more occurrences within quadrangles adjacent to, or nearby a specific district of the Cross Valley Contractors.

APPENDIX B.

FEDERAL SENSITIVE PLANT SPECIES THAT OCCUR OR ARE LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA

Appendix B. Federal Sensitive Plant Species Documented within U.S.G.S. Quadrangle Areas Containing Portions of Districts within the Cross Valley Contract Service Area.

Cross Valley Contractor	Cross Valley Subcontractor	Heart-leaved thorn mint	Forked fiddleneck	Heartscale	Brittlescale	San Joaquin saltbush	Lesser saltscale	Lost hills crownscale	South coast range morningglory	Slough thistle	Hispid bird's beak	Recurved larkspur	Spiny-sepaled button celery	Kernville poppy	Hollisteria	Coulter's goldfields	Pale-yellow layia	Comanche point layia	Panoche pepper-grass	Jared's pepper-grass	Little mousetail	Gairdner's yampah	Nine mile canyon phacelia	Sanford's arrowhead	Oil neststraw	Mason's neststraw
County of Fresno	Fresno County Waterworks # 34												A											A		
County of Tulare	Alpaugh Irrigation District			X	X			A		X		X														
	Atwell Island Water District			X	X			A		X		A				A										
	City of Lindsay																									
	City of Visalia			X									X													
	Hills Valley Irrigation District												X													
	Sausalito Irrigation District			X								X	X			A										
	Small wood vineyards																									
	Stone Corral Irrgation District												X													
	Strathmore P.U. D.											A														
	Styro-Tek , Inc.			A								X				A										
Hills Valley Irrigation District													X													

Appendix B. Federal Sensitive Plant Species Documented within U.S.G.S. Quadrangle Areas Containing Portions of Districts within the Cross Valley Contract Service Area.

Cross Valley Contractor	Cross Valley Subcontractor	Heart-leaved thorn mint	Forked fiddleneck	Heartscale	Brittlescale	San Joaquin saltbush	Lesser saltscale	Lost hills crownscale	South coast range morningglory	Slough thistle	Hispid bird's beak	Recurved larkspur	Spiny-sepaled button celery	Kemville poppy	Hollisteria	Coulter's goldfields	Pale-yellow layia	Comanche point layia	Panoche pepper-grass	Jared's pepper-grass	Little mousetail	Gairdner's yampah	Nine mile canyon phacelia	Sanford's arrowhead	Oil neststraw	Mason's neststraw
Kern-Tulare Irrigation District				A								X						A							A	A
Lower Tule River Irrgation District				X								X	X			A										
Pixley Irrigation District				X								X				X										
Rag Gulch Water District				A								X				A										
Tri-Valley Water District													X													

Key: 'X' indicates one or more occurrences within quadrangle areas contained by the specific district of the Cross Valley Contractors.
'A' indicates one or more occurrences within quadrangles adjacent to, or nearby a specific district of the Cross Valley Contractors.

APPENDIX C.

FEDERAL AND STATE ENDANGERED AND THREATENED ANIMALS, OR ANIMALS PROPOSED FOR LISTING THAT OCCUR OR ARE LIKELY TO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA

Appendix C. Federal and State Endangered, Threatened, or Candidate Species with Potintial to occur in Specific Districts of the Cross Valley Division Contract Service Area.

	Fresno County	Tri-Vallley Water District	Hills Valley Irrigation District	Lower Tule Irrigation District	Pixley Irrigation District	Tulare County	Rag Gulch Water District	Kern-Tulare Water District
Vernal Pool Fairy Shrimp	X	X	X					
Vernal pool tadpole shrimp	X	X	X					
Valley elderberry longhorn beetle	X	X	X	X	X	X	X	X
California tiger salamander	X	X	X	X	X			
California red-legged frog								
Blunt-nosed leopard lizard				X	X	X		
Giant garter Snake								
California Condor								
Bald Eagle								
Swainson's Hawk				X	X	X		
American Peregrine Falcon								
Least Bells Vireo								
San Joaquin antelope squirrel								
Tipton kangarooo rat				X	X	X		
San Joaquin kit fox				X	X	X		

APPENDIX D.

FEDERAL SENSITIVE AND STATE SPECIES-OF-CONCERN AND FULLY PROTECTED ANIMAL SPECIES THAT OCCUR OR ARE LIKELYTO OCCUR WITHIN WATER DISTRICTS OF THE CROSS VALLEY CONTRACTORS CONTRACT SERVICE AREA

Appendix D. Federal and State Species of Concern with Potintial to occur in Specific Districts of the Friant Division Contract Service Area.

	Fresno County	Tri-Vallley Water District	Hills Valley Irrigation District	Lower Tule Irrigation District	Pixley Irrigation District	Tulare County	Rag Gulch Water District	Kern-Tulare Water District
Western spadefoot	X	X	X					
Coast horned lizard				X	X	X	X	X
Silvery legless lizard				X	X			
San joaquin whipsnake								
Western pond turtle	X	X	X	X	X	X	X	X
American White Pelican								
Double-crested Cormorant				X	X	X		
Western Least ittern				X	X			
White-faced Ibis				X	X	X		
Osprey								
White-tailed Kite	X	X	X	X	X	X	X	X
Northern Harrier	X	X	X	X	X	X	X	X
Sharp-shinned Hawk	X	X	X	X	X	X	X	X
Cooper's Hawk	X	X	X	X	X	X	X	X
Ferruginous Hawk	X	X	X	X	X	X	X	X
Golden Eagle	X	X	X	X	X	X	X	X
Merlin	X	X	X	X	X	X	X	X
Prairie Falcon	X	X	X	X	X	X	X	X
Western Snowy Plover				X	X			
Mountain Plover				X	X	X		
Long-billed Curlew	X	X	X	X	X	X	X	X
California Gull	X	X	X	X	X	X	X	X
Burrowing Owl	X	X	X	X	X	X	X	X
Long-eared owl	X	X	X	X	X	X	X	X
Short-eared Owl	X	X	X	X	X	X	X	X
Loggerhead Shrike	X	X	X	X	X	X	X	X
California Horned Lark	X	X	X	X	X	X	X	X
San Joaquin Le Conte's Thrasher								
Yellow Warbler	X	X	X	X	X	X	X	X
Yellow-breated Chat								
Tricolored Blackbird	X	X	X	X	X	X	X	X
Townsend's big-eared bat								

APPENDIX E.

CROSS VALLEY CONTRACTORS, SUBCONTRACTORS, AND ASSOCIATED U.S.G.S. QUADRANGLE AND COUNTY COVERAGE.

Appendix E. List of Water Districts with Associated U.S.G.S. Quadrangle Names for the Cross Valley Contract Service Area			
Cross Valley Contractors	**Cross Valley Subcontractors**	**U.S.G.S. Quadrangle**	**County(ies) Covered by Quadrangle**
County of Fresno	Fresno County Waterworks #34	Friant	Fresno/Madera
County of Tulare	Alpaugh Irrigation District	Allensworth	Kern/Tulare
		Alpaugh	Tulare
		Hacienda Ranch	Kern/Kings/Tulare
		Hacienda Ranch NE	Kings/Tulare
		Wasco NW	Kern
	Atwell Island Water District	Allensworth	Kern/Tulare
		Alpaugh	Tulare
		Hacienda Ranch	Kern/Kings/Tulare
		Hacienda Ranch NE	Kings/Tulare
	City of Lindsay Water Service Area	Lindsay	Tulare
	City of Visalia	Exeter	Tulare
		Goshen	Kings/Tulare
		Visalia	Tulare
	Hills Valley Irrigation District	Orange Cove North	Fresno/Tulare
	Sausalito Irrigation District	Ducor	Tulare
		Porterville	Tulare
		Sausalito School	Tulare
		Woodville	Tulare
	Smallwood Vineyards	Ducor	Tulare
	Stone Corral	Ivanhoe	Tulare
		Stokes Mountain	Tulare
	Strathmore P.U.D.	Lindsay	Tulare
	Styro-Tek, Inc.	Delano East	Kern/Tulare
Hills Valley Irrigation District		Orange Cove North	Fresno/Tulare
Kern-Tulare Irrigation District		Deepwell Ranch	Kern
		Delano East	Kern/Tulare
		Ducor	Tulare
		McFarland	Kern
		North of Oildale	Kern
		Richgrove	Kern/Tulare
Lower Tule River Irrigation District		Cairns Corner	Tulare
		Corcoran	Kings/Tulare
		Porterville	Tulare

Appendix E. List of Water Districts with Associated U.S.G.S. Quadrangle Names for the Cross Valley Contract Service Area			
Cross Valley Contractors	**Cross Valley Subcontractors**	**U.S.G.S. Quadrangle**	**County(ies) Covered by Quadrangle**
Lower Tule River Irrigation District, cont.		Taylor Weir Tipton Tulare Woodville	Tulare Tulare Tulare Tulare
Pixley Irrigation District		Alpaugh Pixley Sausalito School Taylor Weir Tipton Woodville	Tulare Tulare Tulare Tulare Tulare Tulare
Rag Gulch Water District		Deepwell Ranch Delanor East Richgrove	Kern Kern/Tulare Kern/Tulare
Tri-Valley Water District		Orange Cove North Wahtoke	Fresno/Tulare Fresno

APPENDIX F.

CONSULTATION HISTORY ON CVP-RELATED ACTIONS ON FILE WITH THE U.S. FISH AND WILDLIFE SERVICE FIELD OFFICE, SACRAMENTO CALIFORNIA

October 15, 1991—Friant Water Contract Renewals (1-1-91-F-22), San Joaquin kit fox, blunt-nosed leopard lizard, Fresno kangaroo rat, and other species (amended May 14, 1992, appended to 1-1-95-F-39 on February 27, 1998)

February 12, 1993—Long-Term Operations Critera and Plan for CVP Reservoirs (1-1-93-F-10), bald eagle, salt marsh harvest mouse, California clapper rail.

May 23, 1993—Operations Criteria and Plan (1-1-92-F-18), bald eagle, salt marsh harvest mouse, California clapper rail.

May 26, 1993—Operations Criteria and Plan-Delta smelt (1-1-92-F-32) delta smelt.

September 2, 1993—Los Vaqueros vernal pool shrimp conference opinion (1-1-93-C-68), vernal pool fairy shrimp, longhorn fairy shrimp, California linderiella.

September 3, 1993—Los Vaqueros Terrestrial (1-1-92-F-48), San Joaquin kit fox, bald eagle.

September 9, 1993—Los Vaqueros Project (1-1-93-F-35), delta smelt.

December 27, 1994—Interim Water Contract Renewal (1-1-94-F-69), San Joaquin kit fox, large-flowered fiddleneck, giant garter snake, vernal pool fairy shrimp, other species.

February 23, 1995—Amendment of December 27, 1994, Interim Water Contract Renewal opinion to include critical needs planning (1-1-95-F-39).

March 6, 1995—Long-term Operations Criteria and Plan (1-1-94-F-70) delta smelt, delta smelt critical habitat, Sacramento splittail [amended April 26, 1995 (1-1-95-I-804)].

April 9, 1995—Striped Bass Management (1-1-95-F-58), delta smelt (amended on May 30, 1996).

August 7, 1995—Los Vaqueros Project adoption of September 2, 1993, conference opinion (1-1-95-F-117), vernal pool fairy shrimp and longhorn fairy shrimp.

June 6, 1996—Los Vaqueros Project (1-1-95-F-134), formal conference California red-legged frog and Alameda Whipsnake (amended November 1, 1995).

August 14, 1996—Interim Operation of Kern Water Bank (1-1-95-F-63), San Joaquin kit fox and many others. [Action converted to a Habitat Conservation Plan (1-1-97-F-108)].

November 8, 1996—Los Vaqueros Project amendment and adoption of June 6, 1996, conference opinion for California red-legged frog and issuance of conference opinion for Alameda whipsnake (1-1-96-F-151).

April 26, 1996—Temporary Barriers (1-1-96-F-53), delta smelt and delta smelt critical habitat.

January 20, 1998—Interim Water Contract Renewal Opinion amendment (1-1-98-I-383), San Joaquin kit fox, large-flowered fiddleneck, giant garter snack, vernal pool fairy shrimp, other species.

March 19, 1998—Refuge Water Supply Program (1-1-98-F-61) giant garter snake.

May 4, 1998—Draft Jeopardy on Interim South Delta Project (1-1-97-F-184), delta smelt and delta smelt critical habitat.

December 7, 1998—Conveyance of Refuge Water Supply East and West Sacramento Valley (1-1-99-F-15) giant garter snake.

March 11, 1999—Water Service Contracts with Sacramento County Water Agency, San Juan Water District, and City of Folsom (1-1-97-F-161), several species.

March 19, 1999—Solano Project Contract Renewal (1-1-99-F-54), several species.

June 28, 1999—Refuge Water Conveyance Mendota Wildlife Management Area, Kern and Pixley National Wildlife Refuges (1-1-99-F-36) several species.

July 26, 1999—Amendment to 1-1-99-F-15 Refuge Water Conveyance, West and East Sacramento Valley (1-1-99-128) giant garter snake and valley elderberry longhorn beetle.

September 21, 1999—CVPIA Land Retirement Program Demonstration Project, Fresno, Kings and Tulare Counties (1-1-99-F-125) several species.

February 29, 2000-Interim Biological Opinion (1-1-00-F-0056) several species

March 24, 2000-California Toxocs Rule (1-1-98-F-21) several species.

November 21,2000-Implementation of the CVPIA and Continued Operation and Maintenance of the CVP, Programmatic Consultation (1-1-98-F-0124)

APPENDIX G.

COMPARISON BETWEEN EXISTING CONDITIONS AND NEGOTIATED CONTRACT PROVISIONS FOR LONG-TERM CONTRACT RENEWAL WITHIN THE CROSS VALLEY CONTRACT SERVICE AREA

Contract Provisions

Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
Explanatory Recitals	No similar recital.	Assumes water rights held by CVP from SWRCB for use by water service contractors under CVP policies
	No similar recital.	Assumes CVP has been relied upon and considered essential by contractors
	No similar recital.	Assumes Secretary through coordination, cooperation and partnership will pursue measures to improve water supply
	No similar recital.	Assumes that loss of water supply reliability would have impact on socioeconomic conditions and change land use
Definitions		
"Base supply"	No similar definition.	Quantity of Project Water designated in contracts as the amount determined from historic deliveries and is considered relatively reliable in normal or wet years
"Charges"	Assumes to be payments in addition the Rates determined by the Contracting Officer each year.	Assumes rewording of definition of Charges to exclude both Rates and Tiered Pricing Increments
"Contract Total"	No similar definition.	Total of Base Supply and Supplemental Supply of Project Water and is subject to south of delta criteria.
"Landholder"	Assumes to be entity owning lands served irrigation water.	Landholder described in existing Reclamation Law
"M&I Water"	Assumes to be for other than irrigation or to provide water for irrigation of land in units less than or equal	Same as IRC

Contract Provisions

Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
	to 5 acres as M&I water unless Contracting Officer satisfied use is irrigation.	
"Supplemental Supply"	No similar definition.	Quantity of Project water that is in addition to and less reliable than the Base Supply.
Terms of Contract - Right to Use Contract	Assumes subsequent interim renewal only for stated circumstances precluding a long-term renewal.	Assumes contracts shall be renewed subject to conditions for Ag and unconditioned for M&I
		Sets Dec. 31, 2024 as date on which determination on conversion may be made upon mutually agreeable terms
Water to be Made Available and Delivered to the Contractor	Assumes water availability in any year dependent upon existing conditions	Same as IRC.
	Assumes compliance with Biological Opinions and other environmental documents for contracting.	Assumes rewording to add requirement contractor is within legal authority to implement.
	No similar provision.	Assumes that current operating policies strive to minimize impacts to CVP water users
Time for Delivery of Water	Assumes methods for determining timing of deliveries	Assumes methods for determining timing of deliveries as in existing contracts
Point of Diversion	Assumes methods for determining point of diversion	Assumes methods for determining point of diversion as in existing contracts

Contract Provisions

Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
and Responsibility for Distribution of Water		
Measurement of Water Within District	Assumes measurement for each turnout or connection for facilities that are used for all water supplies	Same as IRC
Rates and Method of Payment for Water	Does not include Tiered Pricing. Assumes advanced payment for rates for 2 months.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 2 months.
Non-interest Bearing Operation and Maintenance Deficits	Assumes either there is no non-interest bearing deficit or that agreement is in place to retire any non-interest bearing deficit.	Assumes language from existing contracts
Sales, Transfers, or Exchanges of Water	Assumes sales, transfers or exchanges with others. Does not discuss rates applicable to such actions.	Assumes continuation of transfers with rate for transferred water being transferor's rate adjusted for additional or reduced costs related to transfer and adjusted to remove any ability to pay relief.
Application of Payments and Adjustments	Assumes refund of overpayment after satisfaction of any accrued indebtedness upon contractor request.	Assumes minor changes associated with methods described for overpayment including requirement for $1,000 or greater overpayment for refund.

Contract Provisions

Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
Temporary Reduction - Return Flows	Assumes that current operating policies strives to minimize impacts to CVP water users	Same as IRC.
Constraints on Availability of Project Water	Assumes that current operating policies strives to minimize impacts to CVP water users	Same as IRC.
Unavoidable Groundwater Percolation	Assumes that some of applied CVP water will percolate to groundwater	Same as IRC
Rules and Regulations	Assumes that CVP will operate in accordance with then existing rules	Same as IRC.
Water and Air Pollution Control	Assumes that CVP will operate in accordance with then existing rules	Same as IRC.
Quality of Water	Assumes that CVP will operate in accordance with existing rules without obligation to operate towards water quality goals	Same as IRC.
Water Acquired by the Contractor Other than from the	Assumes that CVP will operate in accordance with existing rules	Same as IRC.

Contract Provisions

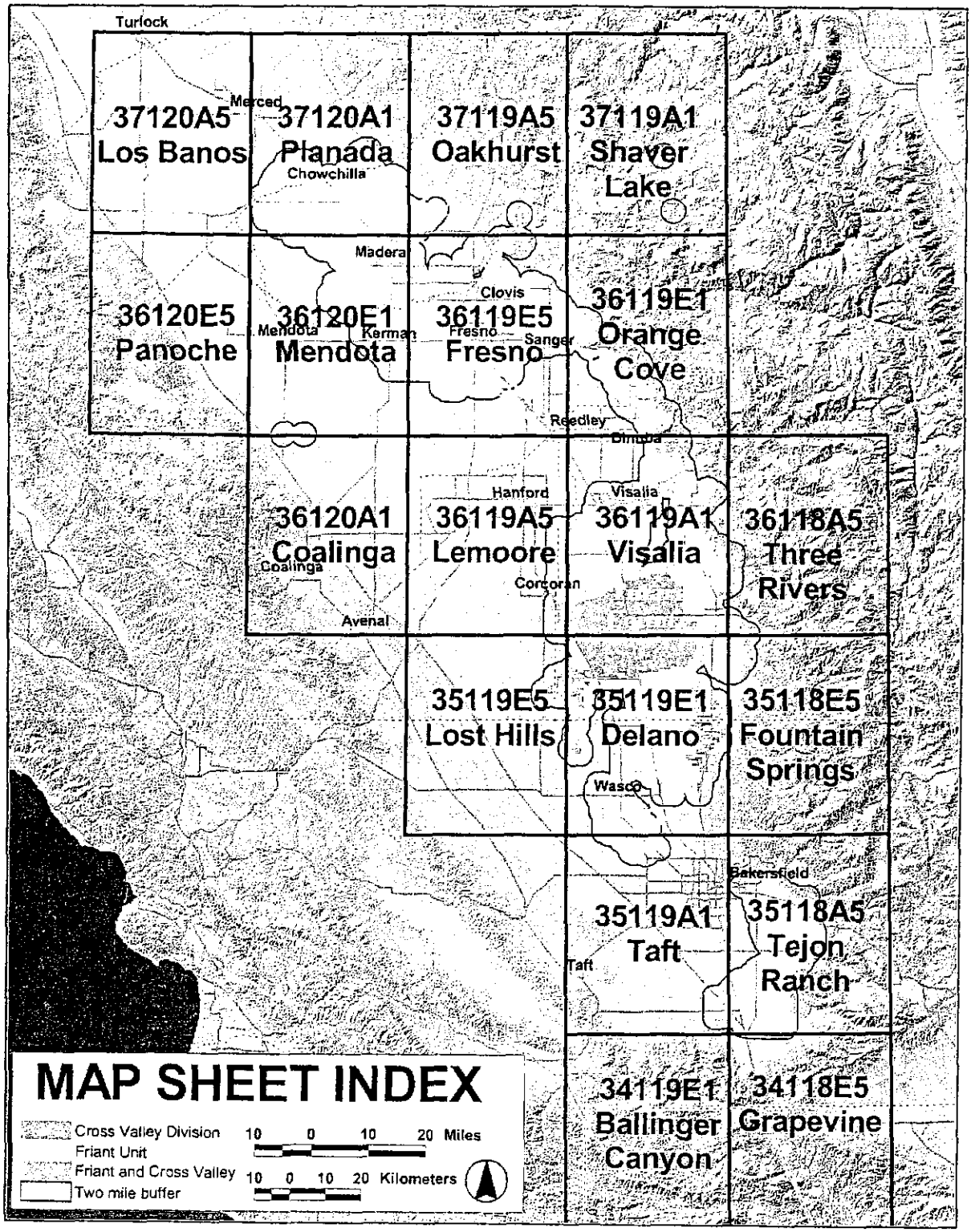
Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
United States		
Opinions and Determinations	Opinions and determinations not to be arbitrary, capricious or unreasonable. Parties may seek relief, adjustment, monetary damages if they are.	Assumes minor changes with respect to references to the right to seek relief
Coordination and Cooperation	No similar provision.	Assumes that coordination and cooperation between CVP operations and users should be implemented and CVP users should participate in CVP operational decisions. Parties retain exclusive decision making authority.
Charges for Delinquent Payments	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
Equal Opportunity	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
General Obligation	Assumes that CVP will operate in accordance with existing rules	Assumes that CVP will operate in accordance with existing rules, however assumes no requirement for contractor to levy in advance
Compliance with Civil Rights Laws and Regulations	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
Privacy Act Compliance	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
Contractor	Assumes that CVP will operate in accordance with	Same as IRC.

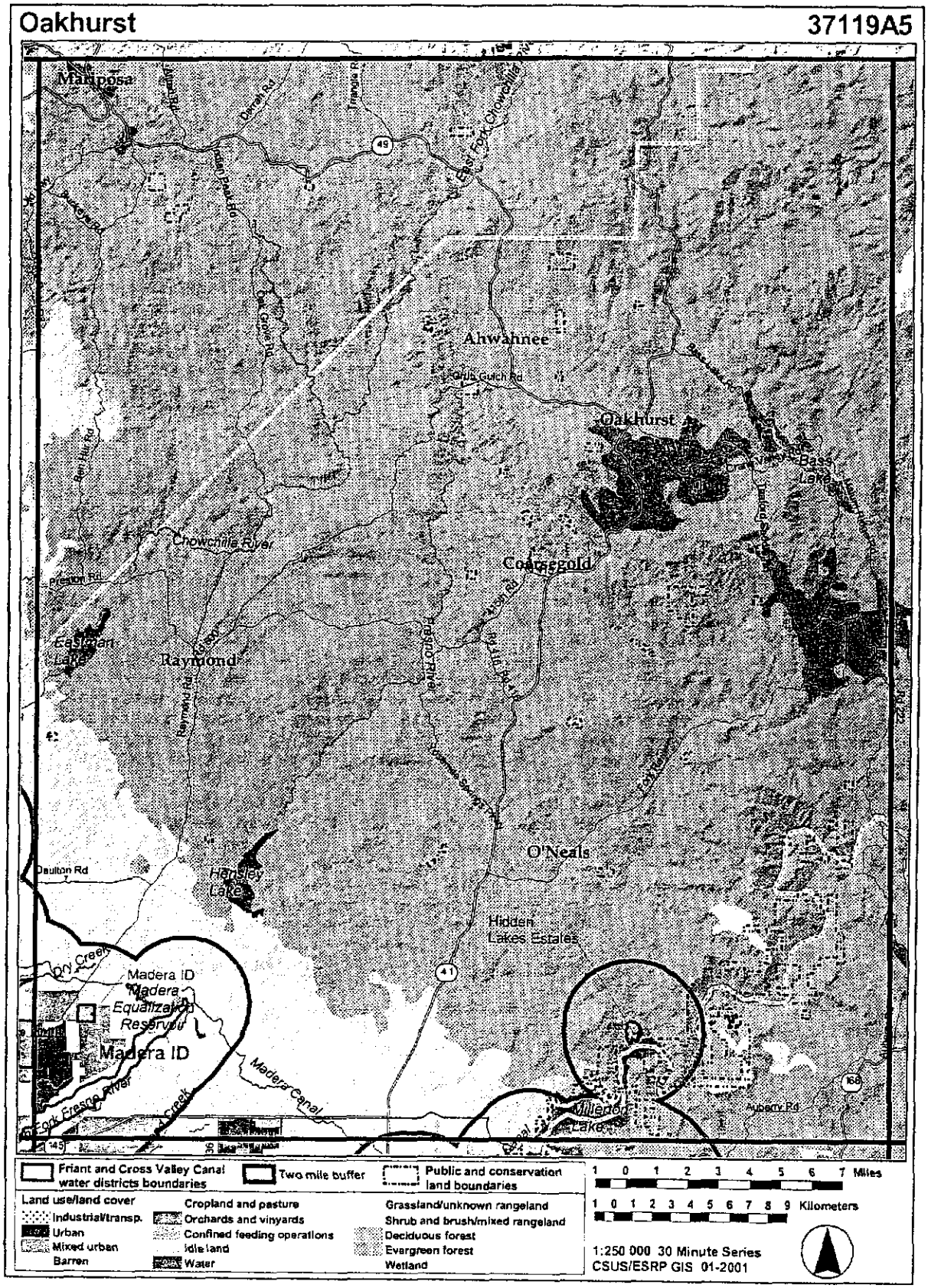
Contract Provisions

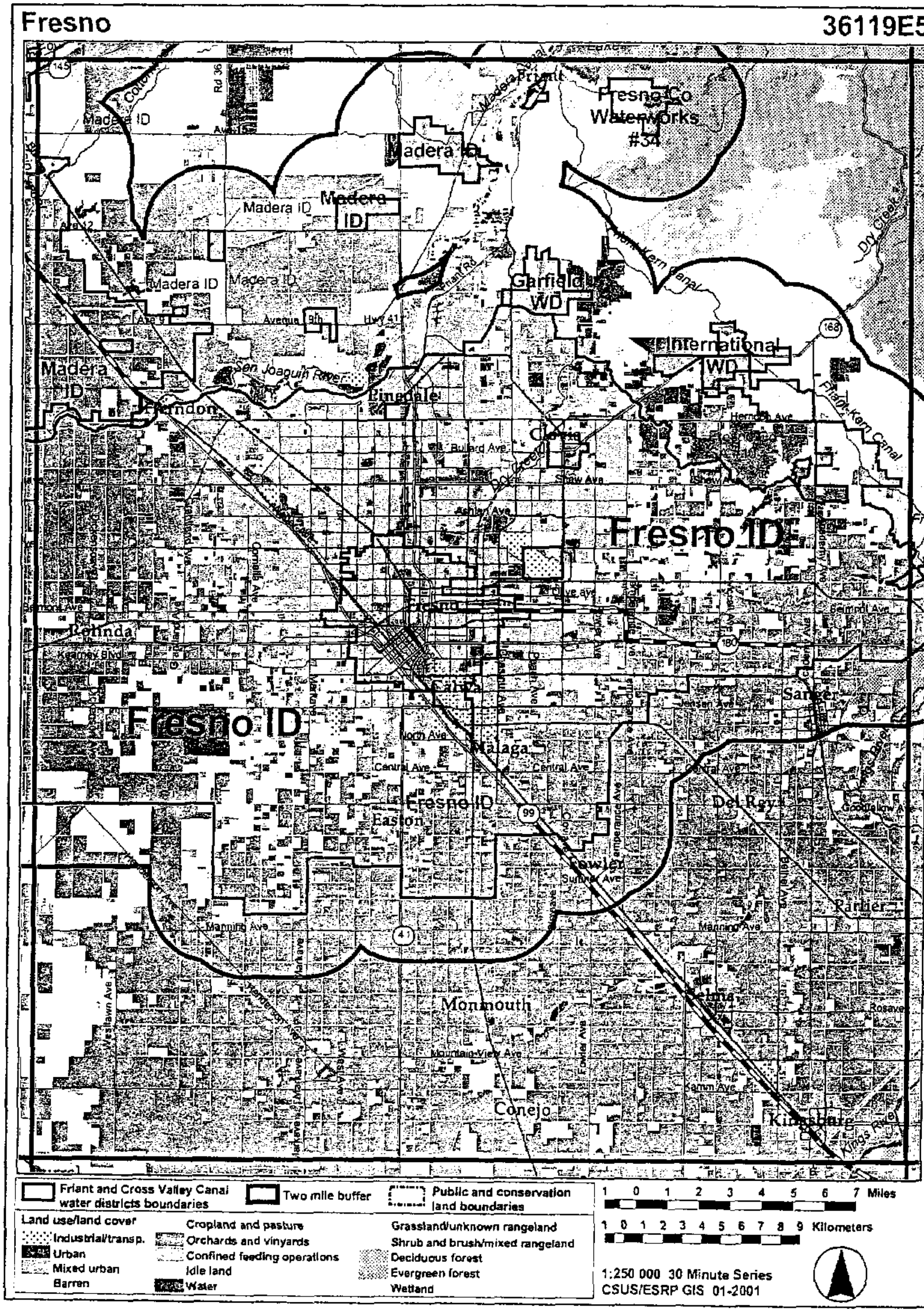
Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
to Pay Certain Miscellaneous Costs	existing rules	
Water Conservation	Assumes compliance with conservation programs established by Reclamation and the State	Same as IRC.
Existing or Acquired Water or Water Rights	Assumes that CVP will operated in accordance with existing rules	Same as IRC.
Operation and Maintenance by Non-federal Entity	Assumes non-federal entity will operate and maintain facilities and that certain payments to be made to that entity.	Assumes minor changes to language that would allow subsequent modification of operational responsibilities
Contingent on Appropriation or Allotment of Funds	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
Sub-contractors	Subcontractors are as equally bound to meet the contract provisions as contractor	Same as IRC
Books,	Assumes that CVP will operate in accordance with	Assumes changes for record keeping for both CVP

Contract Provisions

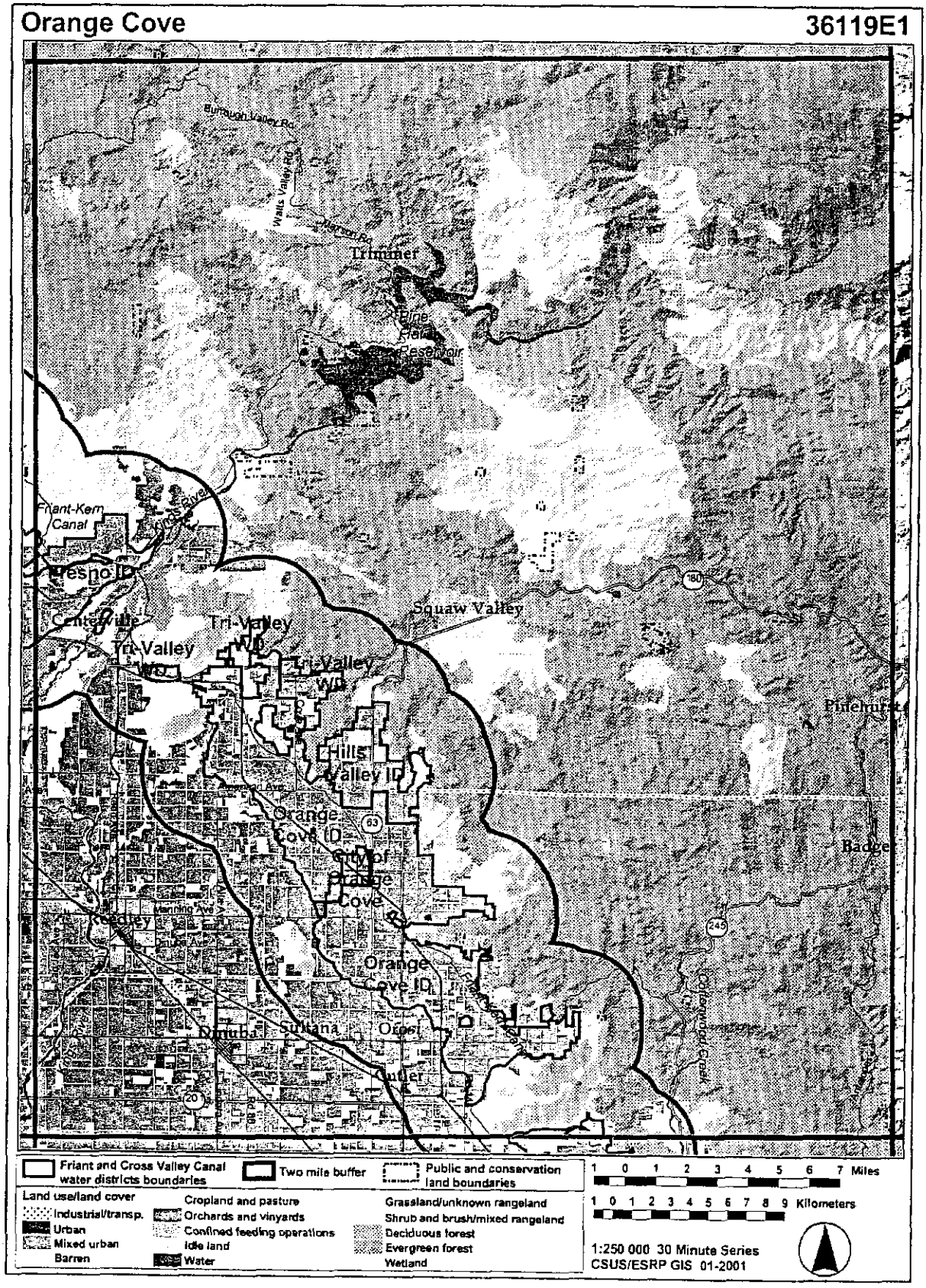
Provision	Based on Interim Renewal Contract (IRC)	Based on Final Negotiated Contract for Cross Valley Contractors
Records, and Reports	existing rules	operations and CVP users
Assignment Limited	Assumes that CVP will operate in accordance with existing rules	Assumes changes to facilitate assignments
Severability	Assumes that CVP will operate in accordance with existing rules	Same as IRC
Resolution of Disputes	*No similar provision.*	Assumes a Dispute Resolution Process
Officials Not to Benefit	Assumes that CVP will operate in accordance with existing rules	Same as IRC.
Changes in Contractor's Service Area	Assumes that CVP will operate in accordance with existing rules	Assumes changes to limit rationale used for non-consent with no set time limit for assumed consent
Notices	Assumes that CVP will operate in accordance with existing rules	*Same as IRC.*
Confirmation of Contract	Assumes that CVP will operate in accordance with existing rules	Assumes Court confirmation of contract and includes provision that contract not binding until court confirms is deleted.

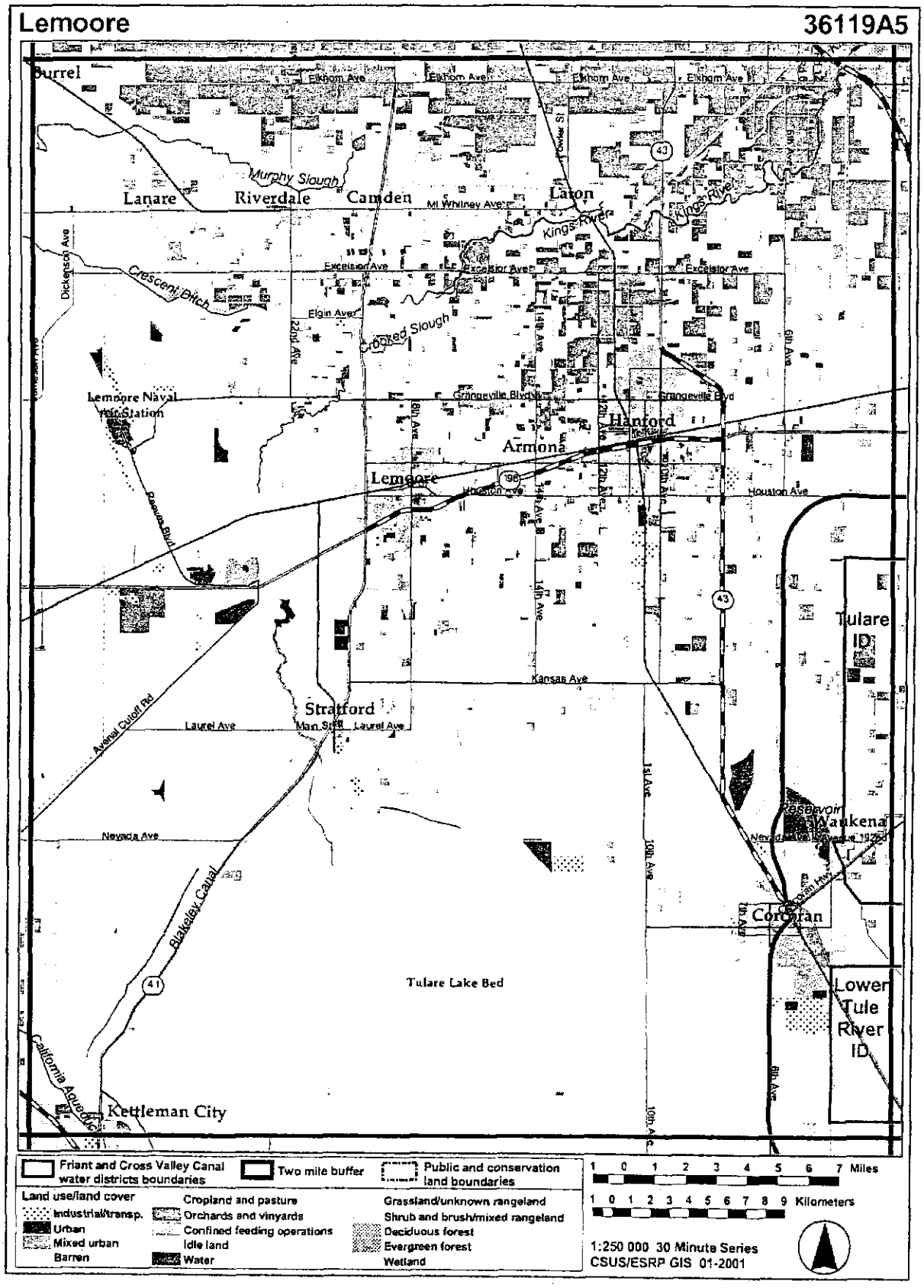

Turlock
Merced
37120A5
Los Banos
37120A1
Planada
Chowchilla
37119A5
Oakhurst
37119A1
Shaver
Lake
Madera
Clovis
36120E5
Panoche
36120E1
Mendota
Mendota
Kerman
36119E5
Fresno
Fresno
Sanger
36119E1
Orange
Cove
Reedley
Dinuba
Hanford
Visalia
36120A1
Coalinga
Coalinga
Avenal
36119A5
Lemoore
Corcoran
36119A1
Visalia
36118A5
Three
Rivers
35119E5
Lost Hills
35119E1
Delano
Wasco
35118E5
Fountain
Springs
Bakersfield
35119A1
Taft
Taft
35118A5
Tejon
Ranch
34119E1
Ballinger
Canyon
34118E5
Grapevine
MAP SHEET INDEX
Cross Valley Division
Friant Unit
Friant and Cross Valley
Two mile buffer
10 0 10 20 Miles
10 0 10 20 Kilometers

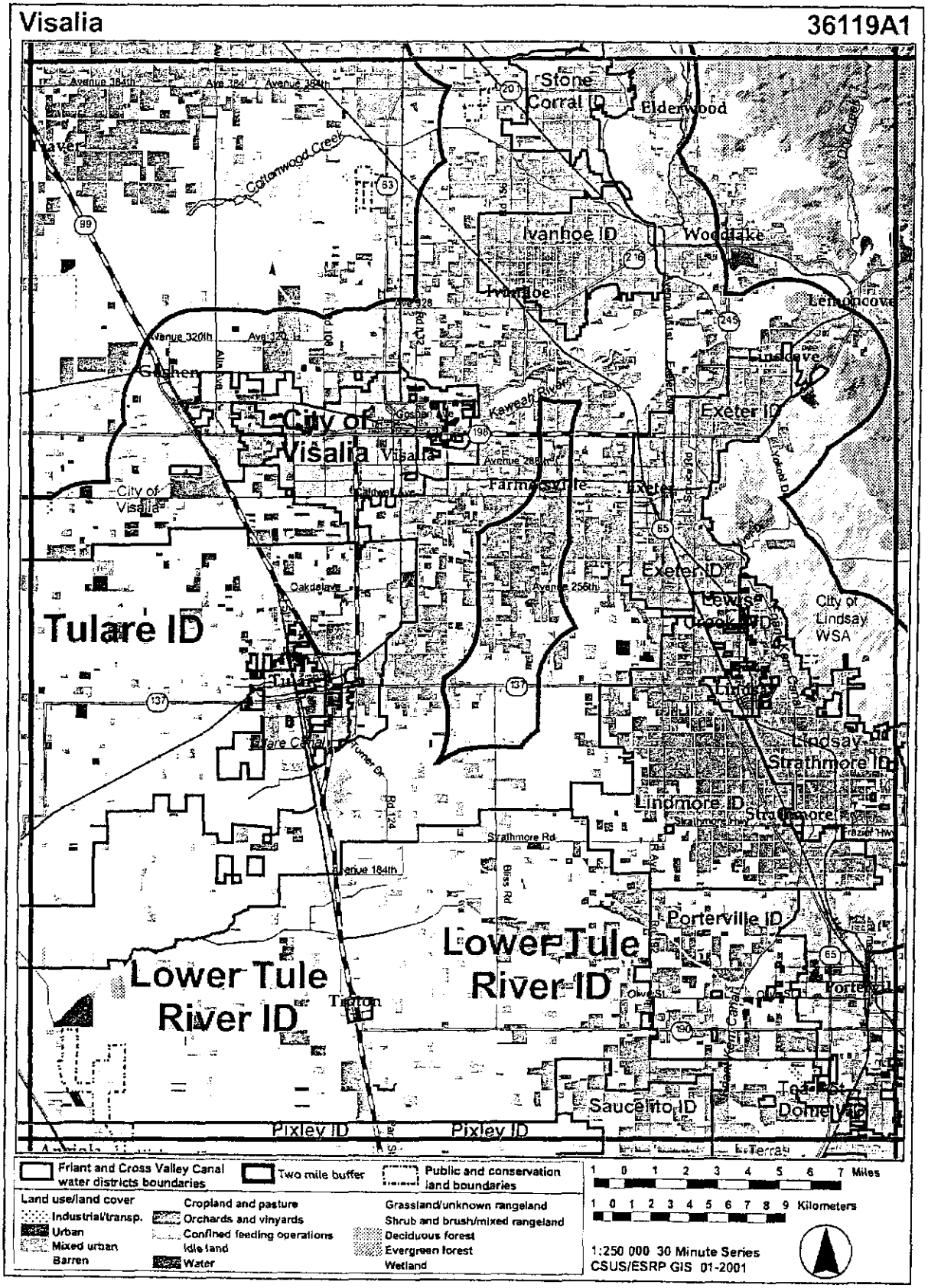

Oakhurst
37119A5
Mariposa
Ahwahnee
Oakhurst
Bass Lake
Coarsegold
Chowchilla River
Preston Rd
Eastman Lake
Raymond
Daulton Rd
Hensley Lake
O'Neals
Hidden Lakes Estates
Dry Creek
Madera ID
Madera Equalizing Reservoir
Madera ID
Madera Canal
Fresno River
Millerton Lake
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001

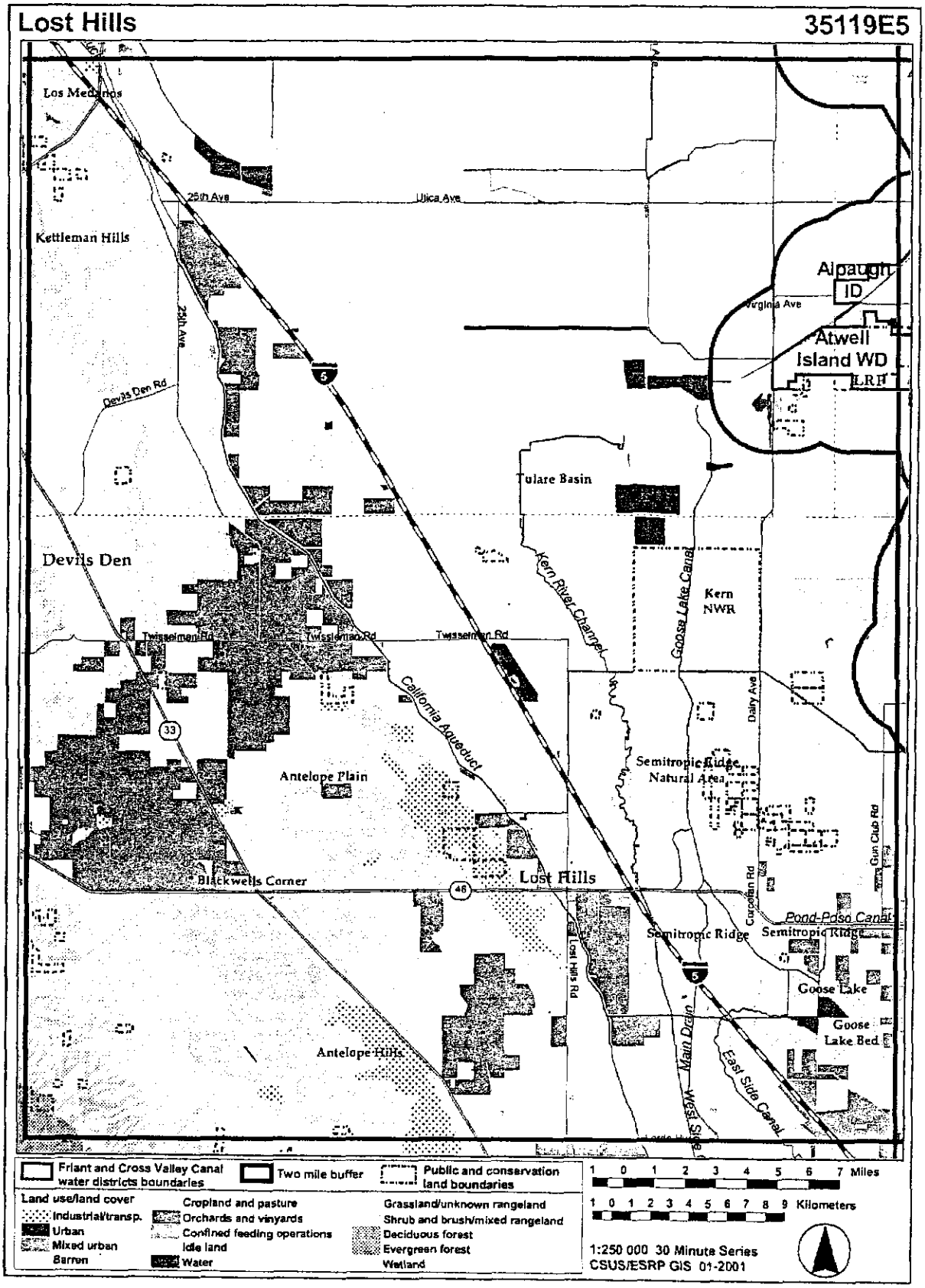


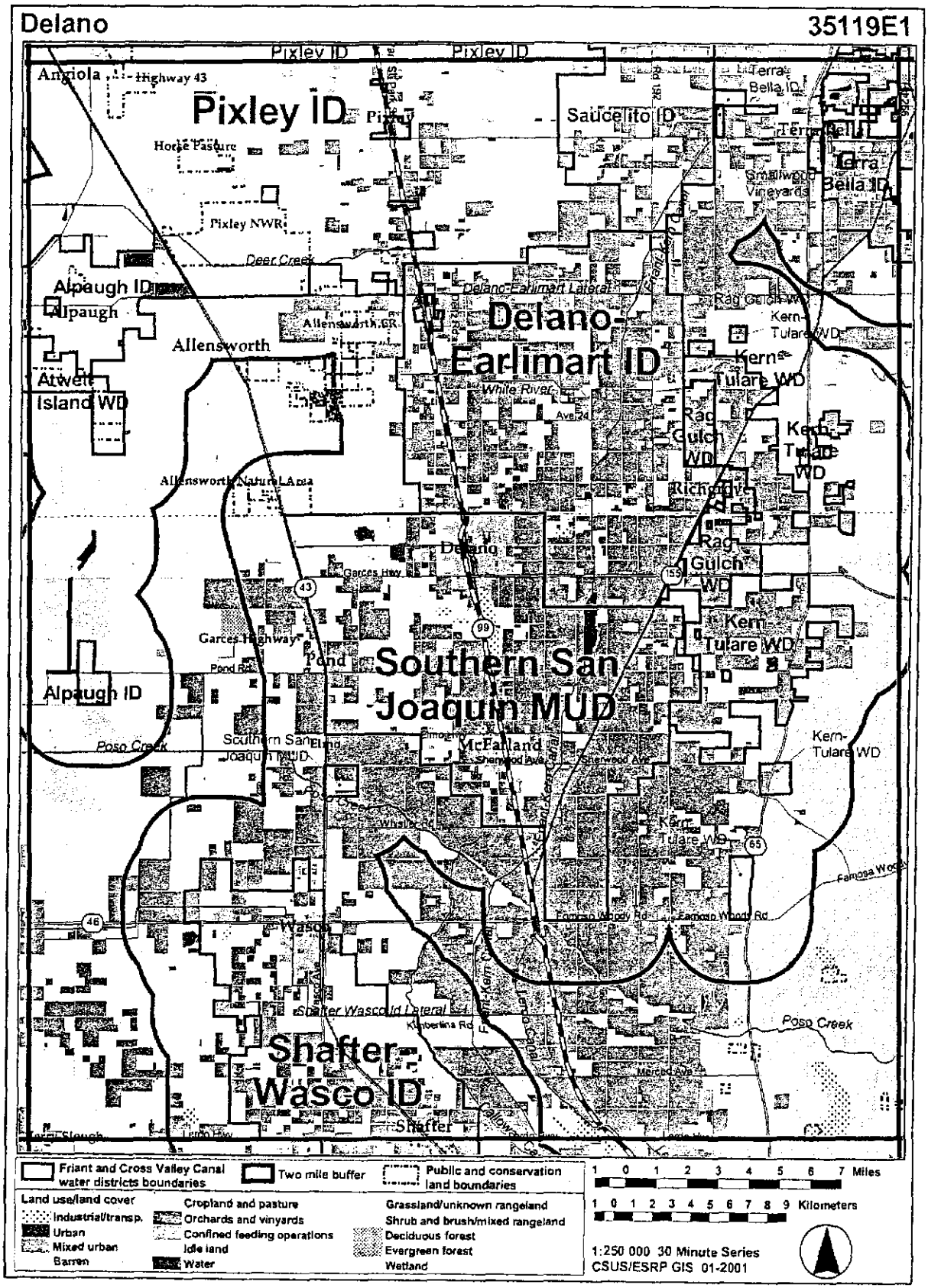
Fresno
36119E5
Madera ID
Madera ID
Madera ID
Madera ID
Madera ID
Madera ID
Fresno Co Waterworks #34
Garfield WD
International WD
San Joaquin River
Pinedale
Herndon
Clovis
Bullard Ave
Shaw Ave
Ashlan Ave
Fresno ID
Friant-Kern Canal
Dry Creek
Kolinda
Kearney Blvd
Fresno
Calwa
Fresno ID
North Ave
Malaga
Central Ave
Fresno ID
Easton
Sanger
Del Rey
Fowler
Parlier
Manning Ave
Monmouth
Mountain View Ave
Conejo
Kamm Ave
Kingsburg
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vinyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001

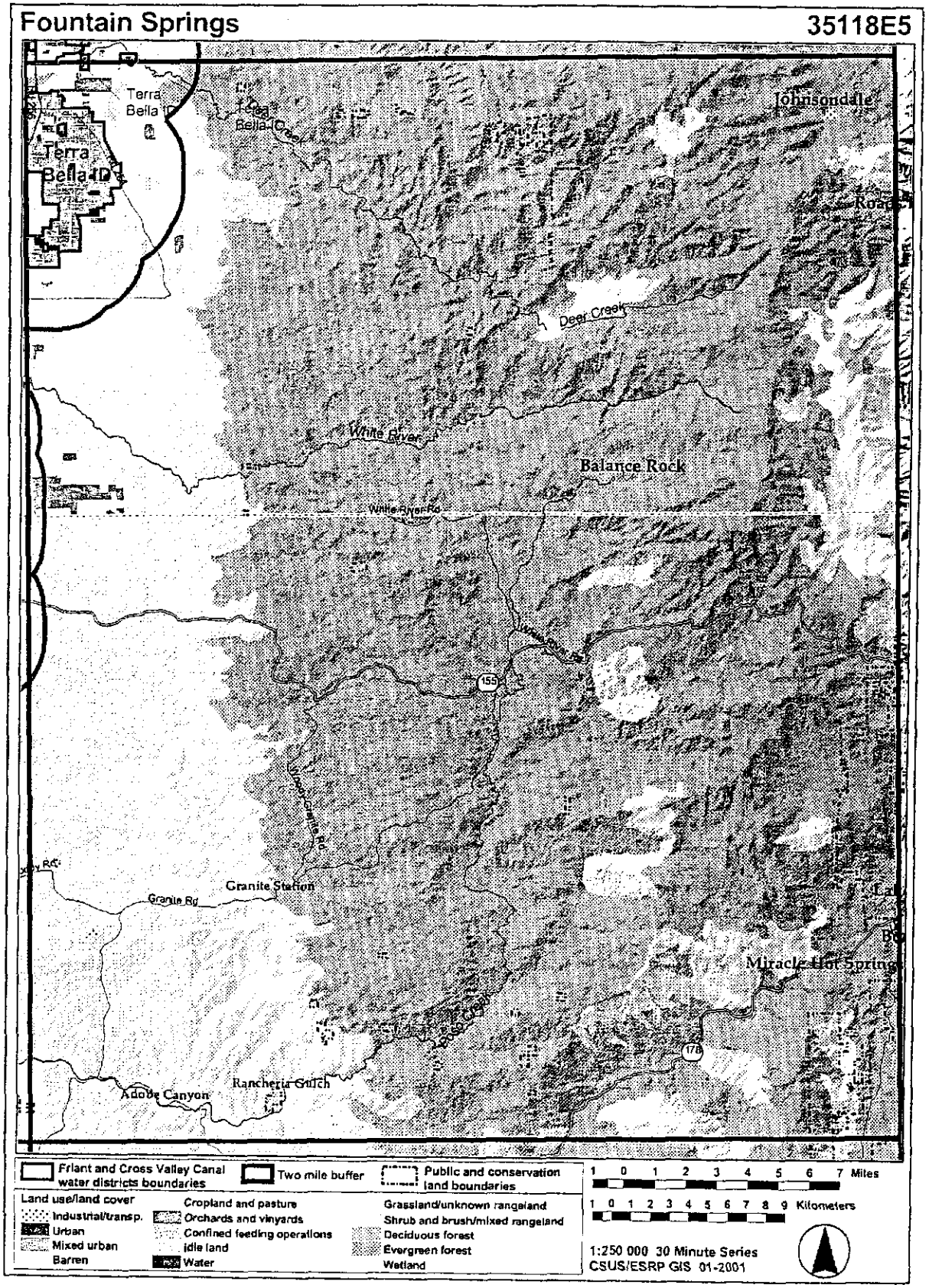

Orange Cove
36119E1
Burrough Valley Rd
Wahtoke Rd
Trimmer
Pine Flat Reservoir
Friant-Kern Canal
Kings River
Fresno ID
Centerville
Tri-Valley WD
Squaw Valley
Pinehurst
Hills Valley ID
Orange Cove ID
City of Orange Cove
Badger
Reedley
Orange Cove ID
Dinuba
Sultana
Orosi
Cutler
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001


Lemoore
36119A5
Burrel
Elkhorn Ave
Murphy Slough
Lanare
Riverdale
Camden
Laton
Mt Whitney Ave
Kings River
Dickenson Ave
Crescent Ditch
Excelsior Ave
Elgin Ave
Crooked Slough
Lemoore Naval Air Station
Grangeville Blvd
Hanford
Armona
Lemoore
198
Houston Ave
Reeves Blvd
Kansas Ave
Tulare ID
Stratford
Main St
Laurel Ave
Avenal Cutoff Rd
Nevada Ave
Blakeley Canal
Tulare Lake Bed
Waukena
Corcoran
Lower Tule River ID
41
California Aqueduct
Kettleman City
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001


Visalia
36119A1
Stone Corral ID
Elderwood
Tulare ID
Ivanhoe ID
Woodlake
Exeter ID
City of Visalia
Lewis
City of Lindsay WSA
Lindsay
Strathmore ID
Lindmore ID
Porterville ID
Lower Tule River ID
Pixley ID
Saucelito ID
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001


Lost Hills
35119E5
Los Medanos
25th Ave
Ulica Ave
Kettleman Hills
25th Ave
Devils Den Rd
Alpaugh ID
Virginia Ave
Atwell Island WD
LRH
Tulare Basin
Devils Den
Kern River Channel
Goose Lake Canal
Kern NWR
Twisselman Rd
Twisselman Rd
Twisselman Rd
California Aqueduct
Dairy Ave
Semitropic Ridge Natural Area
Antelope Plain
Gun Club Rd
Blackwells Corner
Lost Hills
Carpenter Rd
Pond-Poso Canal
Semitropic Ridge
Semitropic Ridge
Lost Hills Rd
Goose Lake
Goose Lake Bed
Antelope Hills
Main Drain
West Side
East Side Canal
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vinyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001


Delano
35119E1
Pixley ID
Pixley ID
Pixley ID
Anziola
Highway 43
Horse Pasture
Pixley NWR
Deer Creek
Alpaugh ID
Alpaugh
Allensworth
Allensworth CR
Atwell Island WD
Allensworth Natural Area
Delano-Earlimart ID
Delano-Earlimart Lateral
White River
Ave 24
Saucelito ID
Terra Bella ID
Terra Bella ID
Smallwood Vineyards
Rag Gulch WD
Kern-Tulare WD
Kern-Tulare WD
Kern-Tulare WD
Rag Gulch WD
Richgrove
Kern-Tulare WD
Rag Gulch WD
Kern-Tulare WD
Delano
Garces Hwy
Garces Highway
Pond
Pond Rd
Southern San Joaquin MUD
Southern San Joaquin MUD
Alpaugh ID
Poso Creek
McFarland
Sherwood Ave
Kern-Tulare WD
Whistle Rd
Kern-Tulare WD
Famosa Woody Rd
Famosa Woody Rd
Wasco
Shafter Wasco Irr Lateral
Kimberlina Rd
Poso Creek
Shafter-Wasco ID
Shafter
Merced Ave
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
Idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001


Fountain Springs
35118E5
Terra Bella ID
Terra Bella ID
Terra Bella ID
Johnsondale
Road
Deer Creek
White River
Balance Rock
White River Rd
155
Granite Station
Granite Rd
Miracle Hot Springs
Rancheria Gulch
Adobe Canyon
Friant and Cross Valley Canal water districts boundaries
Two mile buffer
Public and conservation land boundaries
Land use/land cover
Industrial/transp.
Urban
Mixed urban
Barren
Cropland and pasture
Orchards and vineyards
Confined feeding operations
idle land
Water
Grassland/unknown rangeland
Shrub and brush/mixed rangeland
Deciduous forest
Evergreen forest
Wetland
1 0 1 2 3 4 5 6 7 Miles
1 0 1 2 3 4 5 6 7 8 9 Kilometers
1:250 000 30 Minute Series
CSUS/ESRP GIS 01-2001